COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION

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To: Regional Directors

From: Melanie D. Davenport, Director

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Summary: This guidance document provides staff and permittees in the Chesapeake Bay Watershed with background information and procedures to meet the Chesapeake Bay TMDL Special Condition requirements in the 2013-2018 General Permit for Discharges of Stormwater from Small (Phase II) MS4s, the reissued Phase I MS4 permits, and any Individual Phase II permits that are issued. This document may also be used as a reference to meet the Chesapeake Bay TMDL load allocation for unregulated urban entities as well as local TMDL waste load allocations for nutrients and sediment.

Electronic Copy: An electronic copy of this guidance document is available in PDF format through DEQ's MS4 website.

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Disclaimer:
This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, it does not mandate or prohibit any particular action not otherwise required or prohibited by law or regulation. If alternative proposals are made, such proposals will be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

Guidance for Meeting the Special Condition for the Chesapeake Bay TMDL Requirements

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PART I - BACKGROUND

1. Definitions – For purposes of this guidance document, the following definitions shall apply:

Best Management Practices ("BMPs") – Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices, including both structural and nonstructural practices, to prevent or reduce the pollution of surface waters and groundwater systems

Existing Sources – Pervious and impervious urban land uses served by the MS4 as of June 30, 2009

Impervious Cover – A surface composed of material that significantly impedes or prevents natural infiltration of water into soil

Municipal Separate Storm Sewer System ("MS4") - A conveyance or system of conveyances otherwise known as a municipal separate storm sewer system, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains:

1. Owned or operated by a federal state, city, town, county, district, association, or other public body, created by or pursuant to state law, having jurisdiction or delegated authority for erosion and sediment control and stormwater management, or a designated and approved management agency under § 208 of the CWA that discharges to surface waters;
2. Designed or used for collecting or conveying stormwater;
3. That is not a combined sewer; and,
4. That is not part of a publicly owned treatment works

New Sources – Pervious and impervious urban land uses served by the MS4 developed or redeveloped on or after July 1, 2009

Prior Developed Lands ("Redevelopment") – Land that has been previously utilized for residential, commercial, industrial, institutional, recreation, transportation, or utility facilities or structures, and that will have the impervious areas associated with those uses altered during a land-disturbing activity

Pollutants of Concern ("POC") – Total nitrogen ("TN"), total phosphorous ("TP"), and total suspended solids ("TSS")

Regulated Land – Regulated land refers to the conveyances and drainage area served by the permittee's MS4. For Phase II MS4s regulated land is the conveyances and drainage area that falls within a Census Designated Urbanized Area.

Unregulated Land – Unregulated land means those acres that are not owned or operated by the MS4 permittee AND are located outside the permittee's regulated land.

For terms not defined above, please refer to the 9VAC25-890-1 or 9VAC25-870-10 of the Virginia Administrative Code.

2. Purpose

In the Phase I and Phase II Chesapeake Bay TMDL Watershed Implementation Plan ("WIP") for the Chesapeake Bay Total Maximum Daily Load ("TMDL"), the Commonwealth committed to a phased approach to reducing nutrients and suspended solids discharging from Municipal Separate Storm Sewer Systems ("MS4"). The Special Condition for the Chesapeake Bay TMDL ("Special Condition") in the General VPDES Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (VAR04), effective July 1, 2013, and the eleven Phase I Individual MS4 permits, as they are reissued, requires MS4 operators to develop a Chesapeake Bay TMDL Action Plan ("Action Plan") and submit it to the Virginia Department of Environmental Quality ("Department").

The Action Plan should provide a review of the current MS4 program, which demonstrates the permittee's ability to ensure compliance with the Special Condition and include the means and methods the permittee will use to meet 5.0% of the Level 2 (L2) scoping run reduction for existing development during the first permit cycle. Level 2 implementation equates to an average reduction of 9.0% of nitrogen loads, 16% of phosphorus loads, and 20% of sediment loads from impervious regulated acres and 6.0% of nitrogen loads, 7.25% of phosphorus loads and 8.75% sediment loads from pervious regulated acres beyond 2009 progress loads and beyond urban nutrient management reductions for pervious regulated acreage.

The purpose of this guidance is to provide staff and permittees with methods for meeting the requirements of the Special Condition for the Chesapeake Bay TMDL and the WIP, with particular attention to the development of the Action Plan. It is intended to create consistency in reporting to the Department, as well as ensure that compliance and program evaluations are handled uniformly throughout the Commonwealth. This guidance is specific to the first reissuance of the Phase I MS4 permits since approval of the Chesapeake Bay TMDL and the 2013-2018 General Permit for Discharges of Stormwater from Small MS4s ("GP"). **If there are inconsistencies between the requirements described in this guidance document and the requirements in a permittee's Individual Permit, the individual permit is the controlling document. If additional guidance is needed concerning any inconsistencies, the permittee should contact the Department.**

The GP requires permittees to update their MS4 Program Plans to include the Action Plan no later than 24 months after permit coverage is initiated. Action Plans must be submitted with the Annual Report for the reporting period of July 1, 2014 through June 30, 2015 to the Department by October 1, 2015. Permittees regulated by an Individual VPDES Permit are required to modify their MS4 Program Plans to include the Action Plan and submit it to the Department in accordance with the schedule listed in the Individual Permit. The Action Plan becomes an enforceable part of the MS4 Program Plan unless specifically denied in writing by the Department within the time frame specified by the permit. Permittees may modify the Action Plans during the permit cycle to include new opportunities for reductions or address projects deemed infeasible. Any updates should be submitted to the Department in accordance with the Program Plan Modification section of the permit (GP Section II.F.1).

For reference, the Special Condition as found in 9VAC25-890-40.C of the General Permit is provided in *Appendix I* of this guidance document.

PART II – REQUIRED REDUCTIONS

The permittee's Action Plan should provide the Department with the means and methods that will be implemented to meet the POC reductions required during the first permit cycle. To develop this plan, the permittee will first need to determine the reductions required for each POC. This section identifies the scope of those reductions based on the Special Condition requirements and indicates the steps permittees should follow when delineating the extent of their MS4 system.

1. Scope of Reductions Required by the Permit

Existing Development (GP Section I.C.2.a.(6))
The permit requires permittees to reduce 5.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. During the first permit cycle, Phase II permittees do not need to account for the expanded urbanized areas that were identified as a result of the 2010 US Census. However, permittees should begin to plan for those areas and will need to include them in the updated Draft Action Plan that must accompany the permit reapplication submitted in accordance with the schedule described in the permit. The full 40% POC reductions on those "expanded areas" are required during the second permit cycle.

For newly designated Phase II permittees that were required to obtain a permit as a result of the 2010 Census, all regulated lands should be treated as "expanded areas." That means those permittees are not required to implement any BMPs during the first permit cycle. However, the full 40% POC reductions must be met on all regulated lands by the end of the second permit cycle.

New Sources with an Impervious Land Cover Condition Greater than 16% for the design of post-development stormwater management facilities (*GP Section I.C.2.a.(7))*
If a "new source," where construction is initiated between July 1, 2009 and June 30, 2014, meets an average impervious land cover condition of 16% or less for the design of post development stormwater management facilities, no additional offsets are required under the Special Condition beyond those required for existing conditions (GP SectionI.C.2.a.(6)). If the permittee has adopted an average impervious land cover condition that is greater than 16% or has a "fee-in-lieu of" or similar program that has allowed projects to be built at an average land cover condition greater than 16% for the design of post development stormwater management facilities, those projects may be subject to additional reductions under Special Condition Requirement 7 (GP Section I.C.2.a.(7)) if they disturb 1 acre or greater. For a more detailed description of when additional reductions are necessary under Special Conditions Requirement 7, see *Appendix II*.

Permittees may determine the necessary offsets to meet GP Section I.C.2.a.(7) on a site by site basis (*Appendix II, Example II.1*). However, to simplify the accounting process, the Department encourages permittees to calculate the reductions for this requirement in aggregate (*Appendix II*, *Example II.2*). This may be done by tracking the land use change on all regulated land between July 1, 2009 and June 30, 2014 to determine the increased loads that were not treated and must be addressed under this Special Condition Requirement. Permittees should note that using an aggregate approach may capture lands beyond those that fall under this requirement (i.e. lands less than an acre, lands that have an average impervious land use cover less than 16%). The permittee should choose the most appropriate approach taking into consideration the (1) amount of development that must be accounted for throughout the regulated area, (2) the resources required to perform these calculations on a site by site basis, and (3) the quality of development records available to the permittee.

Grandfathered Projects with an Impervious Land Cover Condition Greater than 16% for the design of post-development stormwater management facilities (*GP Section I.C.2.a.(8))*
The permit also requires permittees to offset any increase in POC from grandfathered projects (as defined in 9VAC 25-870-48) that disturb one acre or greater, and have an impervious land cover condition greater than 16% for the design of post-development stormwater management facilities. Those increases should be offset prior to the completion of the grandfathered projects in accordance with GP Section I.C.3.c. Since the increased loads must be entirely offset prior to completion of the project, they must be accounted for on a case by case basis. For a more detailed description of when additional reductions are required under Special Condition Requirement 8 (GP Section I.C.2.a.(8)), see *Appendix II*.

A flowchart has been included as *Appendix III* to clarify which permit requirement applies to a given project.

2. Calculating Reductions for this Permit Cycle

Permittees should use the appropriate basin tables provided in the permit to estimate the pollutant source loads as of June 30, 2009 and calculate the pollutant reductions necessary to meet the permit requirements. In order to estimate these reductions, as well as calculate how the required reductions will be met, permittees will first need to estimate:

1. The size and extent of their regulated MS4 system as of June 30, 2009; and
2. The total regulated acres of urban pervious and urban impervious surface served by the MS4 as of June 30, 2009.

If there is incomplete data concerning either the extent of the MS4 system or the number of pervious and impervious acres served, permittees should use their best professional judgment to make the best estimates possible. Diagrams have been included in *Appendix IV* to illustrate some of the potential delineation issues discussed in this section.

Size and Extent of the MS4
When estimating the size of the MS4 system, the permittee should not include in its service area the conveyances and drainage area that are regulated by a separate MS4 permit. For permittees that have interconnected systems, MOUs should be considered as a method to clearly differentiate which operator is responsible for which part of the system. For this permit cycle, permittees may also exclude from their regulated urban impervious and regulated urban pervious cover calculations (1) land regulated under the General VPDES Permit for Stormwater Associated with Industrial Activity (VAR05), (2) land regulated under an individual VPDES permit for stormwater discharges, and (3) forested lands[1]. Permittees should clearly document the areas within their jurisdiction that are not included in their regulated acres so the Department is able to verify an appropriate methodology was used. Permittees are encouraged to provide a map depicting the MS4 boundaries, lands serviced by the MS4, and any lands that the permittee has excluded as allowed above.

For Phase II permittees, the Census designated Urbanized Areas and jurisdictional boundaries may be used as a conservative estimate of the area the MS4 serves. It is expected that this data will be refined as the permittee completes the mapping exercise required in Section II B.3.a.(3) of the General Permit. Again, any expanded areas that resulted from the 2010 U.S. Census are not required to be included in the first permit cycle reductions, and Phase II permittees that were identified and designated as a result of

[1] Forested lands may be excluded because they were not assigned a loading in the Bay Program Model. If a permittee chooses to exclude forested acres from its initial reduction calculations, forested lands should also be excluded from the load reduction calculations for individual BMPs.

the 2010 Census are not required to implement BMPs until the second permit cycle. During the next permit cycle these permittees are expected to achieve the full 40% of the L2 scoping run reductions for existing sources in the expanded areas and should plan accordingly. Where data is unavailable or boundaries are unclear, the permittee will need to exercise its best professional judgment in determining the boundaries and service area of its MS4.

Mapping Tools

To estimate the regulated urban impervious and regulated urban pervious acres served by the MS4 as of June 30, 2009 the Department strongly encourages permittees to use the best GIS resources available. In all cases, permittees should use their best professional judgment and the best available data to estimate the number of regulated urban pervious and regulated urban impervious acres served by their MS4 system. Permittees should include a summary of the methodology that was used to estimate the regulated urban impervious acres and regulated urban pervious acres as part of their Action Plan so the Department is able to verify an appropriate method was used.

Base aerial imagery is available to permittees through the Virginia Base Mapping Program, which is administered by the Virginia Geographic Information Network (VGIN). These images can be viewed free of charge using the VEGIS viewer at: http://www.deq.virginia.gov/mapper_ext/default.aspx?service=public/wimby or through VGIN's website. Permittees may use the "Most Recent Imagery" map available through the Virginia GIS Clearinghouse at: http://vgin.maps.arcgis.com/home/ to estimate the amount of pervious and impervious surface in their MS4. This map is a composite of two images that can be accessed separately through this webpage: http://gismaps.vita.virginia.gov/arcgis/rest/services. This site contains links to the most up to date imagery through the "VBMP2009" and "VBMP2011" links. "VBMP2009" contains information for the eastern half of the state, while "VBMP2011" is the most recent map of the western half of the state. This imagery is provided at 1'X1' resolution, which is the image and analytical resolution the Department recommends permittees use.

Permit Tables

Once the regulated urban pervious acres and regulated urban impervious acres are estimated, the permittee can use the appropriate table(s) provided in the permit to estimate the existing source loads for the pollutants of concern. If a permittee has lands that were in transition or under construction as of June 30, 2009 the Department recommends the permittee use the pre-construction land use as the baseline. The first set of tables (*Tables 2a-d*) in the Special Condition provides an estimate of the total pollutant loads entering the applicable river basin based on the June 30, 2009 Progress Run. The second set of tables (*Tables 3a-d*) allows the user to calculate the total load reductions required during this permit cycle in pounds. This is the 5.0% reduction for existing development that the permittee must meet within the first permit cycle.

If a permittee's MS4 system discharges to multiple river basins, the permittee will need to calculate pollutant loads and load reductions for each basin to which the MS4 discharges.

PART III – ELIGIBLE BMPS AND CREDIT OPPORTUNITIES[2]

To meet the reduction requirements for this permit cycle, permittees should implement BMPs that are in the Virginia Stormwater BMP Clearinghouse (*Appendix V.A*) or have been approved by the Chesapeake Bay Program ("Bay Program") (*Appendices V.B-V.I)*. As BMPs are approved by the Bay Program during the permit cycle, they may also be used to meet the implementation requirements of this permit. Permittees are encouraged to work with the Department throughout Action Plan development, including submitting draft plans for review.

The means and methods provided to the Department must show that, based on the information available at the time the Action Plan is approved, the BMPs implemented by the permittee will meet the reductions required by the Special Condition for the Chesapeake Bay TMDL for this permit cycle. Implementation of the BMPs in the permittee's approved Action Plan will demonstrate compliance with the reduction requirements for this permit cycle regardless of efficiency changes that may occur after the Action Plan is approved. Any changes in established efficiencies will not be retroactively applied to projects approved to meet reductions for this permit cycle. The same credit guarantee will apply to any BMPs included in the Action Plan that are completed or under construction by the end of the permit term. For planning purposes, when multiple reduction efficiencies are available through Bay Program BMPs, expert panel reports, or other sources, the permittee is encouraged to use the most conservative value for any future projects not expected to be completed or under construction by the end of the permit term.

Permittees should also note that projects may require local, state, or federal permits such as the General Permit for Discharges of Stormwater from Construction Activities or Virginia Water Protection Permits and this should be taken into account as BMPs are selected. If a permittee has been awarded a grant based on efficiencies that have been revised prior to submittal of the Action Plan, the award will not be revoked or altered due to these circumstances. However, to meet the Special Condition, permittees will need to recalculate the reductions from those BMPs based on the most up-to-date efficiencies at the time the Action Plan is completed.

1. Calculating Credits

Estimating the pollutant reductions provided by an installed BMP is primarily a two-step process. First, the load draining to the BMP should be calculated using the applicable loading rates in the permit in Tables 2a-d. Next, the reductions created by a BMP should be applied to that calculated load (for most structural BMPs this will be a percent efficiency). The result is the POC reduced. Depending on the BMP installed this procedure may vary slightly. More detailed information concerning how to perform calculations for accepted BMPs can be found in *Appendix V*. **Permittees should submit their BMP data with their Annual Report using the spreadsheet provided on DEQ's website.**

Permittees may receive credit for:

A. *Structural BMPs* –To calculate the credits generated by structural BMPs, the permittees may use, as applicable, (1) the efficiencies in the Virginia Stormwater BMP Clearinghouse (*Appendix V.A*), (2) the retrofit performance curves provided by the Bay Program (*Appendix V.B*), or (3) the approved or interim Bay Program efficiencies (*Appendix V.C*). Permittees may also receive credit

[2] This guidance focuses solely on urban BMPs. If there are other types of land that are within a permittee's service area and/or drain to the permittee's system, the permittee should refer to the Bay Program's guidance for applicable BMPs. The application of these BMPs will be reviewed on a case by case basis.

for BMP Enhancements and Conversions (*Appendix V.D*). The impact of treatment trains should also be considered by permittees (*Appendix V.E*).

B. *Land Use Change* – To calculate the credits generated by a land use change, permittees should use the conversion factors presented in *Appendix V.F*. In addition to the Land Use Change Credit, permittees may receive an efficiency credit for Forest Buffers which is explained in greater detail in *Appendix V.G*.

C. *Urban Stream Restoration* – There are five methodologies permittees may use to calculate reductions from Urban Stream Restoration (*Appendix V.H)*. In accordance with GP Section I.C.2.b.(1) any BMPs implemented on unregulated lands must exceed baseline reductions. In accordance with GP Section I.C.2.b, the credit for stream restoration projects must be adjusted to account for the baseline reduction required on the unregulated land draining to the restored stream.

D. *Urban Nutrient Management ("UNM")* – Permittees may receive credit for Urban Nutrient Management plans that are developed for unregulated land, public lands one contiguous acre or less[3], and/or privately owned lands that are not golf courses where nutrients are applied. The recommended method for calculating reductions for Urban Nutrient Management is described in *Appendix V.I*.

E. *Nutrient Trading* – Permittees may utilize the DEQ nutrient trading or offset program in accordance with § 62.1-44.19:21.A of the Code of Virginia, governing trading and offsetting. Regulations concerning certification of non-point source nutrient trading along with additional guidance are forthcoming.

F. *Redevelopment* – Permittees may receive credit for redevelopment projects if the pre-development pollutant load is reduced (*Appendix V.J*). **NOTE:** Additional nutrient reductions beyond the VSMP requirements are also potentially creditable through the DEQ nutrient trading program; however, the MS4 permittee and land owner may not both take credit for the reductions. Reduction calculations for individual BMPs implemented on redeveloped land should be performed in the same manner as BMPs applied to existing development.

Permittees may submit alternate POC reduction methods, which the Department will review on a case by case basis. The Department has developed guidance for the approval of Manufactured Treatment Devices ("MTD") that permittees may find useful. This guidance can be found on DEQ's website at: http://www.deq.virginia.gov/Portals/0/DEQ/Water/Guidance/142009.pdf. Currently, the MTD approval process only certifies a practice's TP reductions. Permittees should use the Bay Program curves and/or efficiencies if there is an analogous BMP. If there is not an analogous Bay Program BMP for an approved MTD, the Department will consider TN and TSS credits for those BMPs on a case by case basis.

2. Calculating Credits for BMPs implemented on Unregulated Lands[4]

In accordance with GP Section I.C.2.b.(1) permittees may receive credit for BMPs implemented on unregulated land provided any necessary baseline is met first. Depending on the BMP type, baseline means:

A. *Baseline for Structural BMPs* **–** The baseline for structural BMPs is intended to be consistent with the nutrient trading regulations. In accordance with §62.1-44.19:21 of the Code of Virginia,

[3] Permittees may not receive credit for UNM plans developed on "lands owned or operated by the MS4 operator where nutrients are applied to a contiguous area of more than one acre" because those plans are an existing permit requirement (GP Section II.B.2.c) and are assumed reductions in the WIP.

[4] If the BMP was funded by a nonpoint source grant, it may be contrary to the funding award to seek credit towards required reductions under the Special Condition.

baseline for urban practices from new development shall be in compliance with post-construction nutrient loading requirements of the Virginia Stormwater Management Program regulations, which has been set at 0.45 lbs TP/acre/year for practices installed between July 1, 2009 and June 30, 2014 and 0.41 lbs TP/acre/year for projects installed after July 1, 2014. Any POC reductions beyond these values may contribute to the reductions required by the Special Condition. Associated TN and TSS for the BMPs credited on unregulated land should be calculated on a BMP by BMP basis.

B. *Baseline for Stream Restoration* **–** Permittees may receive full credit for the proportion of regulated urban land that drains to a stream restoration project and an adjusted credit for the proportion of unregulated urban land that drains to the stream restoration project. The credit for unregulated land must account for baseline reductions required by the TMDL and WIP. The method permittees should use to calculate Baseline for these practices is provided in *Appendix V.H*.

C. *Baseline for Urban Nutrient Management* **–** Baseline for urban nutrient management is based on the commitments the Commonwealth made in the WIP, which calls for Nutrient Management Plans (“NMP”s) on 48% of urban pervious lands. If permittees develop NMPs for either public or privately owned lands (except golf courses) that fall outside of the regulated MS4 service area, the permittee may take credit for the lbs/TN and lbs/TP addressed in the plan minus the 48% required by the WIP. See *Appendix V.I.1* for additional information.

PART IV – REPORTING CONTROL MEASURES

1. Implementation for this Permit Cycle

For all BMPs that are implemented to meet the Special Condition requirements, **the permittee should report BMP information in accordance with Section I.C.4 of the General Permit using the spreadsheet developed by the Department**. When submitting this information with the appropriate Annual Report, permittees should designate which BMPs were employed to meet the Chesapeake Bay TMDL POC load reductions.

The method permittees use to estimate the acres treated by each BMP depends on the retrofit. *Appendix VI* provides guidelines for how the acres treated should be considered for each BMP type. In addition to the information required in Section I.C.4 of the General Permit, the permittees should consider maintaining and submitting more detailed calculations for the BMPs that are planned and implemented. This will ensure that the Department can verify the permittee will meet the POC reductions required by the permit.

2. Historical Data

The Department strongly encourages permittees to submit historical data for BMPs installed prior to June 30, 2009 using the DEQ provided spreadsheet found on DEQ's MS4 website. While permittees will not receive credit for BMPs installed prior to July 1, 2009 that have previously been reported to the Department a more accurate accounting of the permittee's historical BMPs will allow the Bay Program to better refine its waste load allocations for Virginia in the next phase of the Bay Program Model. To receive credit for BMPs installed prior to 2009 that have not previously been reported to the Department, the structure **must** have been installed as a dedicated stormwater treatment facility (i.e. recreational ponds will **not** receive credit). If the Department does not receive data from permittees about existing BMPs, no data will be reported to the Bay Program on behalf of that MS4. This may have a direct impact on the permittee's pollutant reduction requirements in subsequent permits.

NOTE: The Department must submit all calibration data to the Bay Program by September, 2015. To ensure all historical data can be incorporated into the package sent to EPA, permittees will need to submit their Historical Data to the Department on or before June 30, 2015.

PART V – REAPPLICATION REQUIREMENTS

For reapplication, the permittee will need to estimate the POC reductions that will be required for the next permit cycle in accordance with Section I.C.5.b. of the General Permit. The draft second phase Chesapeake Bay TMDL Action Plan required under that section should be developed using the most recently approved BMP efficiencies and crediting protocols at the time of submission.

The purpose of the requirements in Section I.C.5.b is to ensure the full 40% reductions are achieved for existing development, expanded areas designated in the 2010 Census, and new sources developed between 2009 and 2014 for which the land cover condition was greater than 16% impervious for the design of post-development stormwater management facilities.

PART VI – CHESAPEAKE BAY TMDL ACTION PLAN ELEMENTS

This section describes the required and suggested elements that should be included to ensure the Chesapeake Bay TMDL Action Plan is approvable. Providing this information as described in this guidance document should ensure consistency in reporting as well as the plan review process. The Action Plan should allow the Department to verify that the permittee will be able to meet the requirements for the Special Condition for the Chesapeake Bay by the end of the first permit cycle.

The Action Plan should include sufficient supporting material to show that the permittee has:

1. Calculated the full scope of offsets for existing development and new sources that are required to be made during the first permit cycle (See *Part II*, *Appendix II*, and *Appendix III*); and,
2. Determined the methods that will be used to meet the 5.0% reductions required by the end of the first permit cycle (See *Part III* and *Appendix V*)

In addition to this, the permit requires that the Action Plan also include:

1. A review of the current MS4 permit authority and implementation capabilities,
2. Existing, new, and modified legal authorities necessary to meet required reductions;
3. An estimate of future grandfathered projects and their acreage;
4. Expected costs for implementing the Action Plan; and,
5. A public comment process and period.

The references in this section refer to the General Permit requirements which can be found in *Appendix I*. The majority of requirements in the Phase I Permits Special Condition are the same as those in the General Permit. Note that the Phase I Individual Permits include a more extensive “Public Comments” requirement (section 10.a and 10.b below).

For existing Phase II permittees, the Action Plans must be completed no later than 24 months after permit coverage and submitted to the Department with the appropriate annual report. For permittees covered by the GP, the submitted Action Plan becomes effective and enforceable 90 days after the date received by the Department unless specifically denied in writing by the Department in accordance with Section I.C.2.a of the General Permit. Permittees covered by Individual Permits must follow the schedule in their permit. Individual Permit permittees will receive an affirmative response from the Department before their Action Plans become enforceable.

Permit Requirements

1. Current Program and Existing Legal Authority (*General Permit Section I.C.2.a.(1)*)
A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator’s ability to ensure compliance with this special condition;

Localities should include by reference the components of their current MS4 program, or other relevant legal authorities, that will be used to meet the Special Condition. This should include a list of the relevant existing legal authorities (i.e. ordinances, permits, orders, contracts, inter-jurisdictional agreements, and/or other enforceable mechanisms).

2. New or Modified Legal Authority (*General Permit Section I.C.2.a.(2)*)

The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition;

New or modified legal authorities that were or will be developed to comply with the Special Condition should be listed. The list should include either (1) why the legal authority was or will be developed or (2) why the existing legal authority needs to be modified. If no new legal authorities are required for permit compliance than a statement as such should be made in place of a list.

3. Means and Methods to Address Discharges from New Sources *(General Permit Section I.C.2.a.(3)*)

The means and methods that will be utilized to address discharges into the MS4 from new sources;

"New Sources" means pervious and impervious urban land uses served by the MS4 developed or redeveloped on or after July 1, 2009. This Special Condition requirement applies to all new sources that would otherwise require post-development stormwater runoff control, as described in GP Section II.B.4.a.

If the new source disturbs one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities, the permittee should see *Part VI.6*, *Part VI.7, and Appendix II* of this guidance. Additional offsets may be necessary.

If the new source does not utilize an average impervious land cover condition greater than 16% for the design of post development stormwater management facilities no additional offsets are required under the Special Condition beyond those for existing development. Similarly, if a new source disturbs less than 1 acre, no additional offsets are required under the Special Condition beyond those for existing development. The permittee may fulfill this requirement with a short narrative describing the programmatic tools the permittee uses to address new sources.

4. Estimated Existing Source Loads and Calculated Total Pollutant of Concern (POC) Required Reductions *(General Permit Section I.C.2.a.(4) and (General Permit Section I.C.2.a.(5)*)

An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable [Table/Tables] in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009, and the 2009 Edge of Stream (EOS) loading rate;

A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable [Table/Tables] in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate. For the purposes of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4.[5]

The POC loads and required reductions should be calculated using the tools described in this guidance document. The permittee should, at a minimum, provide a summary describing how pervious and impervious surface for the MS4 was estimated (e.g. the GIS resources that were used). The Department

[5] This last sentence applies to Phase II MS4s only.

will need this information to verify that the method used is acceptable. Please see *Part II.2* for additional guidance concerning the delineation of these areas.

Completed calculation tables from the permit should be submitted.

5. **Means and Methods to Meet the Required Reductions and Schedule** *(General Permit Section I.C.2.a.(6)*)

The means and methods, such as management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2 a (5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions;[6]

This section should describe the management practices and retrofit programs (including improvements from redevelopment) that have or will be implemented between July 1, 2009 and the end of the first permit cycle to achieve the 5.0% reductions required for existing development. The permittee should support its plan with calculations that show how the reductions will be met. Any credit trading that is used to meet reductions should also be described here.

The schedule should include estimates of when new management practices will be initiated, when BMP construction will begin, and when BMP installation is expected to be completed. These estimates can be provided as the annual benchmarks required by the permit. For BMPs that have already been implemented at the time the Action Plan is submitted, the permittee should indicate when they were installed.

6. **Means and methods to offset increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014** *(General Permit Section I.C.2.a.(7)*)

The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize the [applicable table] in this section to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.

Permittees may account for these additional offsets on a site by site basis, but the Department recommends taking an aggregate approach to demonstrate compliance with this Special Condition requirement. At a minimum permittees should provide (1) the total additional POC loads created by "new sources" and (2) the 5.0% of those loads permittees must offset during this permit cycle. The BMPs that will be implemented to address them should also be included. See *Appendix II* of this guidance for more information.

7. **Means and methods to offset increased loads from grandfathered projects that begin construction after July 1, 2014** (*General Permit Section I.C.2.a.(8)*)

The means and methods to offset the increased loads from projects as grandfathered in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-

[6] The Arlington Permit goes on to say: *The means and methods implemented prior to July 1, 2009 shall not be credited towards meeting the required reductions indentified in Part I.D.b.1)(e)*.

development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids.

Increases in the POC load from grandfathered projects initiating construction after July 1, 2014, must be offset prior to completion of the project, in accordance with GP Section I.C.3.c. Permittees should include an estimate of the number of acres impacted by grandfathered projects, which will be used to estimate the pollutant loadings created by these projects. This estimate can be provided as an aggregate. The best available data should be used, but where data is unavailable permittees should use their best professional judgment. The strategies that will be used to address this type of development, including any nutrient trading, should also be included.

8. A list of future projects, and associated acreage that qualify as grandfathered
(General Permit Section I.C.2.a.(10))
A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48

To fulfill this requirement, permittees should list projects that have been approved or have an obligation of locality, state, or federal funding prior to July 1, 2012, but have not received coverage under the General Permit for Discharges of Stormwater from Construction Activities prior to July 1, 2014. This permit requirement applies solely to new development, not redevelopment projects.

9. An estimate of the expected cost to implement the necessary reductions
(General Permit Section I.C.2.a.(11))
An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle;

This estimate should cover the expected cost to the permittee. Permittees should have a strategy in place to achieve the (1) 5.0% reductions for the existing sources, (2) 5.0% reductions for the new sources that disturb one acre or greater and have an average impervious land cover condition greater than 16% for the design of post-development stormwater management facilities, and (3) any offsets for grandfathered projects that disturb one acre or greater and have an average impervious land cover condition greater than 16% for the design of post-development stormwater management facilities for this permit cycle. Permittees should also begin to plan for the full reductions that will be required by the end of three permit cycles. Permittees are encouraged to be as detailed as possible as this information will be reviewed by the state when it reevaluates the amount of funding that will be available to aid localities with their programs.

10.a Public Comments on Draft Action Plan (GENERAL PERMIT REQUIREMENTS)
(General Permit Section I.C.2.a.(12))
An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan.

The public comment process and period should be described, including how the process was advertised to the public.

10.b Public Comments on Draft Action Plan (PHASE I PERMIT REQUIREMENTS)

An opportunity for receipt and consideration of public comment on the draft Chesapeake Bay TMDL Action Plan; and, A list of all comments received as a result of public comment and any modifications made to the draft Chesapeake Bay TMDL Action Plan as a result of the public comments.

The public comment process and period should be described, including how the process was advertised to the public**.** The list should include comments received and the permittee's response to public comments.

APPENDIX I

Special condition for the Chesapeake Bay TMDL from the General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems

C. Special condition for the Chesapeake Bay TMDL. The Commonwealth in its Phase I and Phase II Chesapeake Bay TMDL Watershed Implementation Plans (WIP) committed to a phased approach for MS4s, affording MS4 operators up to three full five-year permit cycles to implement necessary reductions. This permit is consistent with the Chesapeake Bay TMDL and the Virginia Phase I and II WIPs to meet the Level 2 (L2) scoping run for existing developed lands as it represents an implementation of 5.0% of L2 as specified in the 2010 Phase I WIP. Conditions of future permits will be consistent with the TMDL or WIP conditions in place at the time of permit issuance.

1. Definitions. The following definitions apply to this state permit for the purpose of the special condition for discharges in the Chesapeake Bay Watershed:

"Existing sources" means pervious and impervious urban land uses served by the MS4 as of June 30, 2009.

"New sources" means pervious and impervious urban land uses served by the MS4 developed or redeveloped on or after July 1, 2009.

"Pollutants of concern" or "POC" means total nitrogen, total phosphorous, and total suspended solids.

"Transitional sources" means regulated land disturbing activities that are temporary in nature and discharge through the MS4.

2. Chesapeake Bay TMDL planning.

a. In accordance with Table 1[7] in this section, the operator shall develop and submit to the department for its review and acceptance an approvable Chesapeake Bay TMDL Action Plan. Unless specifically denied in writing by the department, this plan becomes effective and enforceable 90 days after the date received by the department. The plan shall include:

(1) A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator's ability to ensure compliance with this special condition;

(2) The identification of any new modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition;

(3) The means and methods that will be utilized to address discharges into the MS4 from new sources;

(4) An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable versions of Tables 2 a-d in the section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009, and the 2009 Edge of Stream (EOS) loading rate:

[7] See the General Permit for Table 1

Table 2 a: Calculation Sheet for Estimating Existing Source Loads for the James River Basin (* Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Nitrogen		9.39	
Regulated Urban Pervious			6.99	
Regulated Urban Impervious	Phosphorus		1.76	
Regulated Urban Pervious			0.5	
Regulated Urban Impervious	Total Suspended Solids		676.94	
Regulated Urban Pervious			101.08	

Table 2 b: Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin (* Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Nitrogen		16.86	
Regulated Urban Pervious			10.07	
Regulated Urban Impervious	Phosphorus		1.62	
Regulated Urban Pervious			0.41	
Regulated Urban Impervious	Total Suspended Solids		1,171.32	
Regulated Urban Pervious			175.8	

Table 2 c: Calculation Sheet for Estimating Existing Source Loads for the Rappahannock River Basin (* Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Nitrogen		9.38	
Regulated Urban Pervious			5.34	
Regulated Urban Impervious	Phosphorus		1.41	
Regulated Urban Pervious			0.38	
Regulated Urban Impervious	Total Suspended Solids		423.97	
Regulated Urban Pervious			56.01	

Table 2 d: Calculation Sheet for Estimating Existing Source Loads for the York River Basin (* Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Nitrogen		7.31	
Regulated Urban Pervious			7.65	
Regulated Urban Impervious	Phosphorus		1.51	
Regulated Urban Pervious			0.51	
Regulated Urban Impervious	Total Suspended Solids		456.68	
Regulated Urban Pervious			72.28	

(5) A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable versions of Tables 3 a-d in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate. For the purposes of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4.

Table 3 a: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the James River Basin (*Based On Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre)	Total Reduction Required First Permit Cycle (lbs)[8]
Regulated Urban Impervious	Nitrogen		0.04	
Regulated Urban Pervious			0.02	
Regulated Urban Impervious	Phosphorus		0.01	
Regulated Urban Pervious			0.002	
Regulated Urban Impervious	Total Suspended Solids		6.67	
Regulated Urban Pervious			0.44	

[8] Tables 3a-d replicated in this Appendix are consistent with the tables that appear in the permit. Permittees should note that the Total Reduction's required in the permit represent lbs/yr.

Table 3 b: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre)	Total Reduction Required First Permit Cycle (lbs)[8]
Regulated Urban Impervious	Nitrogen		0.08	
Regulated Urban Pervious			0.03	
Regulated Urban Impervious	Phosphorus		0.01	
Regulated Urban Pervious			0.001	
Regulated Urban Impervious	Total Suspended Solids		11.71	
Regulated Urban Pervious			0.77	

Table 3 c: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the Rappahannock River Basin
(*Based On Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre)	Total Reduction Required First Permit Cycle (lbs)[8]
Regulated Urban Impervious	Nitrogen		0.04	
Regulated Urban Pervious			0.02	
Regulated Urban Impervious	Phosphorus		0.01	
Regulated Urban Pervious			0.002	
Regulated Urban Impervious	Total Suspended Solids		4.24	
Regulated Urban Pervious			0.25	

Table 3 d: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the York River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre)	Total Reduction Required First Permit Cycle (lbs)[8]
Regulated Urban Impervious	Nitrogen		0.03	
Regulated Urban Pervious			0.02	
Regulated Urban Impervious	Phosphorus		0.01	
Regulated Urban Pervious			0.002	
Regulated Urban Impervious	Total Suspended Solids		4.60	
Regulated Urban Pervious			0.32	

(6) The means and methods, such as management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2 a (5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions;

(7) The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.

(8) The means and methods to offset the increased loads from projects as grandfathered in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids.

(9) The operator shall address any modification to the TMDL or watershed implementation plan that occurs during the term of this state permit as part of its permit reapplication and not during the term of this state permit

Table 4: Ratio of Phosphorous Loading Rate to Nitrogen and Total Suspended Solids Loading Rates for Chesapeake Bay Basins

Ratio of Phosphorous to Other POCs (Based on All Land Uses 2009 Progress Run)	Phosphorous Loading Rate (lbs/acre)	Nitrogen Loading Rate (lbs/acre)	Total Suspended Solids Loading Rate (lbs/acre)
James River Basin	1.0	5.2	420.9
Potomac River Basin	1.0	6.9	469.2
Rappahannock River Basin	1.0	6.7	320.9
York River Basin	1.0	9.5	531.6

(10) A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48;

(11) An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle; and

(12) An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan.

b. As part of development of the Chesapeake Bay TMDL Action Plan, the operator may consider:

(1) Implementation of BMPs on unregulated lands provided any necessary baseline reduction is not included toward meeting the required reduction in this permit;

(2) Utilization of stream restoration projects, provided that the credit applied to the required POC load reduction is prorated based on the ratio of regulated urban acres to total drainage acres upstream of restored area;

(3) Establishment of a memorandum of understanding (MOU) with other MS4 operators that discharge to the same of adjacent eight digit hydrologic unit within the same basin to implement BMPs collectively. The MOU shall include a mechanism for dividing the POC reductions created by BMP implementation between the cooperative MS4s;

(4) Utilization of any pollutant trading or offset program in accordance with 10.1-603.15:1 et seq. of the Code of Virginia, governing trading and offsetting;

(5) A more stringent average land cover condition based on less than 16% impervious cover for new sources initiating construction between July 1, 2009, and June 30, 2014, and all grandfathered projects where allowed by law; and

(6) Any BMPs installed after June 30, 2009, as part of a retrofit program may be applied towards meeting the required load reductions provided any necessary baseline reductions are not included.

3. Chesapeake Bay TMDL Action Plan implementation. The operator shall implement the TMDL Action Plan according to the schedule therein. Compliance with this requirement represents adequate progress for this state permit term towards achieving TMDL waste load allocation consistent with the assumptions and requirement of the TMDL. For the purposes of this permit, the implementation of the following represents implementation to the maximum extent practicable and demonstrated adequate progress:

a. Implementation of nutrient management plans in accordance with the schedule identified in the minimum control measure in Section II related to pollution prevention/good housekeeping for municipal operations;

b. Implementation of the minimum control measure in Section II related to construction site stormwater runoff control in accordance with this state permit shall address discharges from transitional sources;

c. Implementation of the means and methods to address discharges from new sources in accordance with the minimum control measure in Section II related to post-construction stormwater management in new development and development of prior developed lands and in order to offset 5.0% of the total increase in POC loads from grandfathered projects initiating construction after July 1, 2014, must be offset prior to completion of the project; and

d. Implementation of means and methods sufficient to meet the required reductions of POC loads from existing sources in accordance with the Chesapeake Bay TMDL Action Plan.

APPENDIX II – MEETING SPECIAL CONDITION REQUIREMENT 7 AND/OR 8

Special Condition Requirements 7 (GP Section I.C.2.a.(7)) and 8 (GP Section I.C.2.a.(8)) apply to permittees that (1) adopted an average impervious land cover condition greater than 16% for the design of post-development stormwater management facilities under the Chesapeake Bay Preservation Act or (2) have allowed projects to be built with an impervious land cover condition greater than 16% for the design of post-development stormwater management facilities through a "fee-in-lieu of" or similar program. The reductions required under these sections of the Special Condition must be made *in addition* to those required for existing conditions as of June 30, 2009 (GP Section I.C.2.a.(6)).

For projects that initiate construction between July 1, 2009 and June 30, 2014 subject to Special Condition Requirement 7 (GP Section I.C.2.a.(7)), permittees must offset 5.0% of the increased load from those projects during this permit cycle. For projects that are grandfathered in accordance with 9VAC26-870-48 and initiate construction after July 1, 2014 subject to Special Condition Requirement 8 (GP Section I.C.2.a.(8)), permittees must offset the entire increased load prior to completion of the project.

These projects are subject to Technical Criteria II C under the VSMP regulations. If permittees use the technology-based criteria under 9VAC25-870-96.C, no additional reductions are required under the Special Condition beyond those for the existing conditions as of June 30, 2009 under General Permit Section I.C.2.a.(6). This is because the technology based criteria assumes as average land cover condition of 16% for the design of post-development stormwater management facilities.

Permittees using the performance-based criteria under 9VAC25-870-96.B may have projects that require additional reductions under General Permit Section I.C.2.a.(7) or I.C.2.a.(8). The VSMP regulations organize the "performance-based criteria" into "four applicable land development situations." For clarity, this Appendix uses the same "situation" framework to explain when additional reductions are required for "new sources" under the Special Condition.

This Appendix is organized by "situation." Under each "situation" header the following information is provided:

1. Each "situation," as is described in 9VAC-25-870-96.B of the VSMP regulations,
2. The VSMP requirements for each performance-based criteria "situation," and;
3. An example diagram and the reduction requirements for each "situation" beyond those required under Section I.C.2.a.(6) of the general permit for each of the following project types:
    a. Redevelopment with an Average Impervious Land Cover Condition of 16% or Less
    b. Redevelopment with an Average Impervious Land Cover Condition Greater than 16%
    c. New Development with an Average Impervious Land Cover Condition of 16% or Less
    d. New Development with an Average Impervious Land Cover Condition Greater than 16%

NOTE: In some of these "situations" meeting the VSMP requirements will result in POC reductions. If that is the case, permittees may take credit for those reductions on prior developed lands and apply those credits to their 2009 baseline reductions under Special Condition Requirement 6 (GP Section I.C.2.a.(6)). Where applicable, these instances are indicated throughout this section. They are also addressed in Appendix V.J.

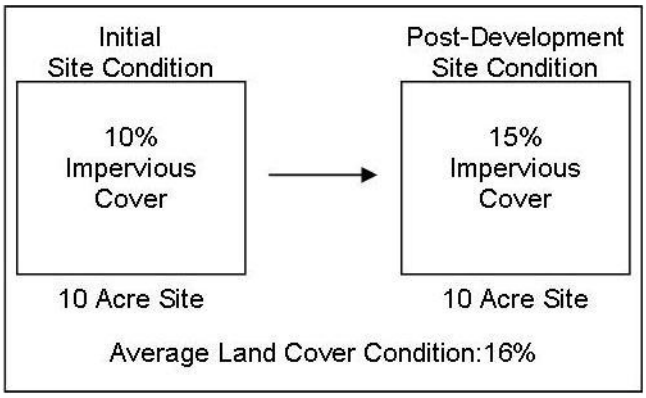
SITUATION 1

Land disturbing activities where the existing percent impervious cover is less than or equal to the average land cover condition and the proposed improvements will create a total percent impervious cover which is less than the average land cover condition.

VSMP Requirement: No reduction in the after disturbance pollutant discharge is required.

Special Condition Requirements*:*

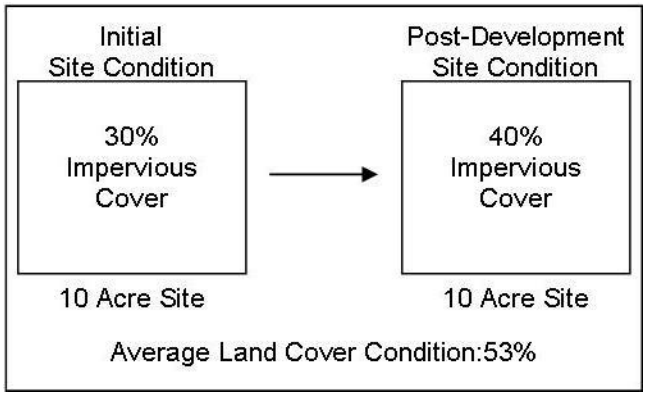
(a) *Redevelopment with an Average Impervious Land Cover Condition of 16% or Less:*



Special Condition Requirement 7: No additional reductions are required for this project type and situation because the average land cover condition is less than 16%.

Special Condition Requirement 8: No additional reductions are required for this project type and situation because the average land cover condition is less than 16%.

(b) *Redevelopment with an Average Impervious Land Cover Condition Greater than 16%:*

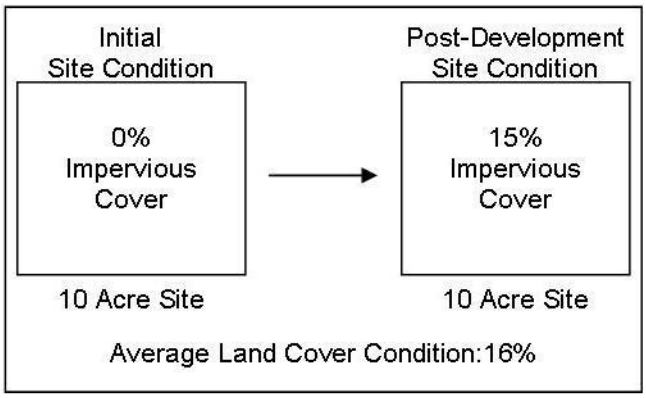


Special Condition Requirement 7: If construction on the project is initiated between July 1, 2009 and June 30, 2014 the permittee must create reductions *in addition* to those required by

Special Condition Requirement 6 (GP Section I.C.2.a.(6)). In this instance, the permittee must offset 5.0% of the incremental[9] increased load from the impervious cover change.

Special Condition Requirement 8: If the project is grandfathered in accordance with 9VAC25-870-48 and construction is initiated after July 1, 2014 the permittee must create reductions *in addition* to those required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)).. In this instance, the permittee must offset the entire incremental increased load from the impervious cover change prior to completion of the project.

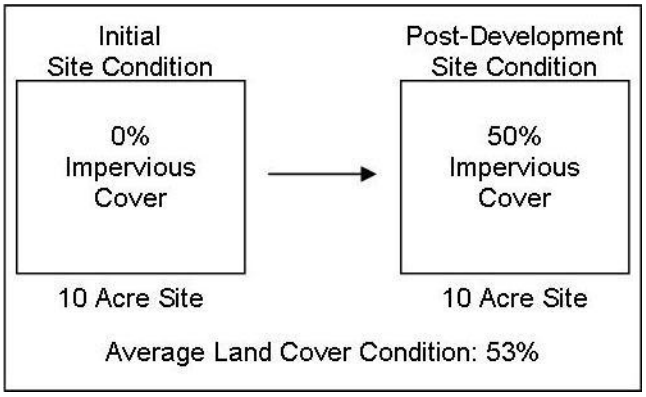
(c) *New Development with an Average Impervious Land Cover Condition of 16% or Less:*



Special Condition Requirement 7: No additional reductions are required for this project type and situation because the average land cover condition is less than 16%.

Special Condition Requirement 8: No additional reductions are required for this project type and situation because the average land cover condition is less than 16%.

(d) *New Development with an Average Impervious Land Cover Condition Greater than 16%*



Special Condition Requirement 7: If construction on the project is initiated between July 1, 2009 and June 30, 2014 the permittee must create reductions *in addition* to those required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)).. In this instance, the permittee

[9] Throughout this section incremental refers to the difference between the initial site impervious cover and the post-development site's impervious cover.

must offset 5.0% of the incremental increased load from the impervious cover change, down to the average land cover condition (50% impervious cover load – 16% impervious cover load).

Special Condition Requirement 8: If the project is grandfathered in accordance with 9VAC25-870-48 and construction is initiated after July 1, 2014 the permittee must create reductions *in addition* to those required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)).. In this instance, the permittee must offset the entire incremental increased load from the impervious cover change, down to the average land cover condition (50% Impervious Cover – 16% Impervious Cover) prior to completion of the project.

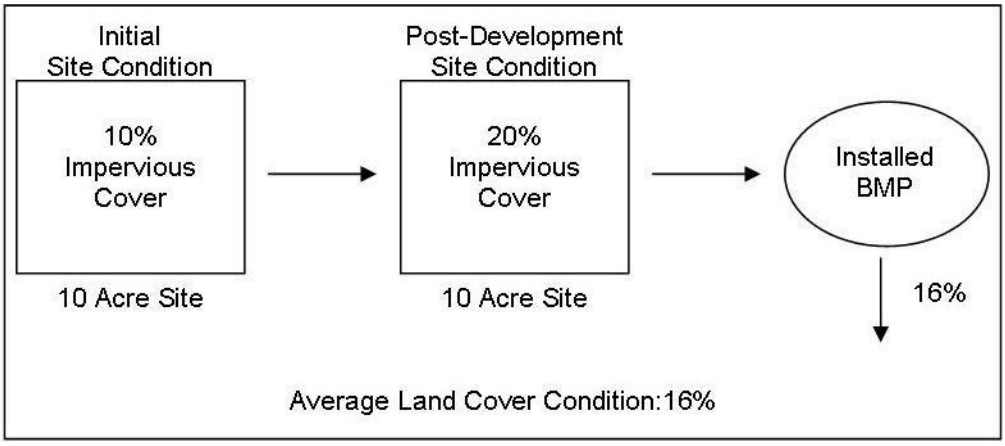
SITUATION 2

Land disturbing activities where the existing percent impervious cover is less than or equal to the average land cover condition and the proposed improvements will create a total percent impervious cover which is greater than the average land cover condition.

VSMP Requirement: The pollutant discharge after disturbance shall not exceed the existing pollutant discharge based on the average land cover condition. If the post-development impervious land cover condition exceeds the average land cover condition, BMPs must be installed on site to offset those increased loads using the techniques described in the Virginia Stormwater Management Handbook, which can be found on DEQs website.

Special Condition Requirement:

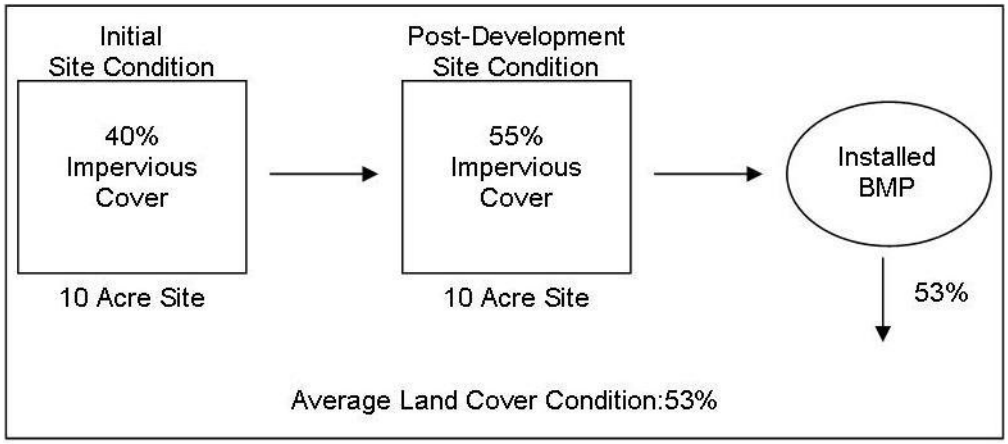
(a) *Redevelopment with an Average Impervious Land Cover Condition of 16% or Less:*



Special Condition Requirement 7: No additional reductions beyond those provided by the "Installed BMP" are necessary because the load draining from the site is equivalent to the load draining from a site with a 16% land cover condition.

Special Condition Requirement 8: No additional reductions beyond those provided by the "Installed BMP" are necessary because the load draining from the site is equivalent to the load draining from a site with a 16% land cover condition.

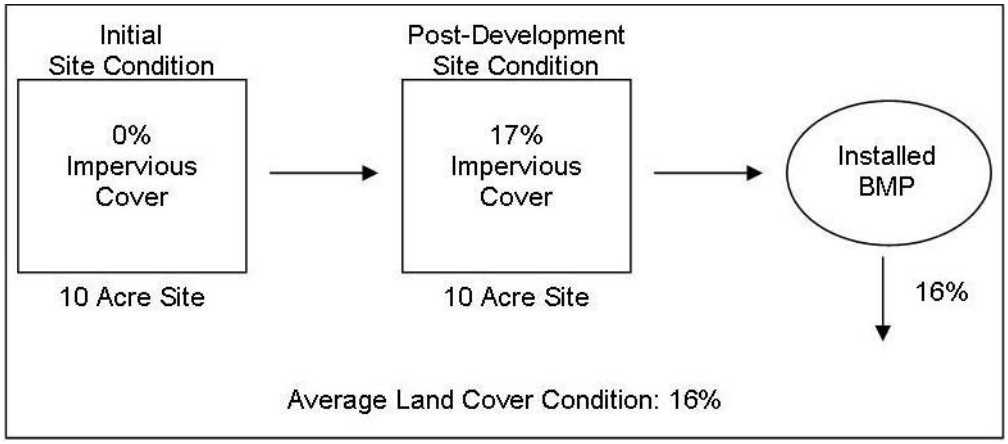
(b) *Redevelopment with an Average Impervious Land Cover Condition Greater than 16%*



Special Condition Requirement 7: If construction on the project is initiated between July 1, 2009 and June 30, 2014 the permittee must create reductions *in addition* to those required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)).. The "Installed BMP" meets the VSMP requirements, since it offsets the additional load to the Average Land Cover Condition. To meet Special Condition Requirement 7 the permittee must determine the remaining incremental load increase from the redevelopment project (53% impervious cover load – 40% impervious cover load). During the first permit cycle, the permittee must offset 5.0% of that load.

Special Condition Requirement 8: If the project is grandfathered in accordance with 9VAC25-870-48 and construction is initiated after July 1, 2014 the permittee must create reductions *in addition* to those required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)).. The "Installed BMP" meets the VSMP requirements, since it offsets the additional load to the Average Land Cover Condition. To meet Special Condition Requirement 8 the permittee must determine the remaining incremental load increase from the redevelopment project (53% impervious cover load – 40% impervious cover load). The permittee must offset the entire load prior to completion of the project.

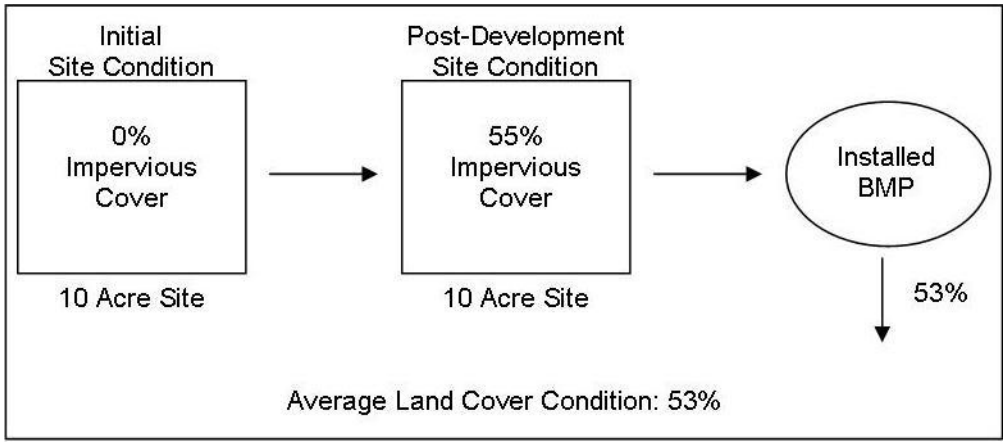
(c) *New Development with an Average Impervious Land Cover Condition of 16% or Less*



Special Condition Requirement 7: No additional reductions beyond those provided by the "Installed BMP" are necessary because the load draining from the site is equivalent to the load draining from a site with a 16% land cover condition.

Special Condition Requirement 8: No additional reductions beyond those provided by the "Installed BMP" are necessary because the load draining from the site is equivalent to the load draining from a site with a 16% land cover condition.

(d) *New Development with an Average Impervious Land Cover Condition Greater than 16%*



Special Condition Requirement 7: If construction on the project is initiated between July 1, 2009 and June 30, 2014 the permittee must create reductions *in addition* to those required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)).. The "Installed BMP" meets the VSMP requirements, since it offsets the additional load to the Average Land Cover Condition. To meet Special Condition Requirement 7 the permittee must determine the remaining incremental load increase from the redevelopment project, down to the 16% Average Land Cover Condition (53% impervious cover load – 16% impervious cover load). During the first permit cycle, the permittee must offset 5.0% of that load.

Special Condition Requirement 8: If the project is grandfathered in accordance with 9VAC25-870-48 and construction is initiated after July 1, 2014 the permittee must create reductions *in addition* to those required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)).. The "Installed BMP" meets the VSMP requirements, since it offsets the additional load to the Average Land Cover Condition. To meet Special Condition Requirement 8 the permittee must determine the remaining incremental load increase from the redevelopment project (53% impervious cover load – 16% impervious cover load). The permittee must offset the entire incremental load prior to completion of the project.

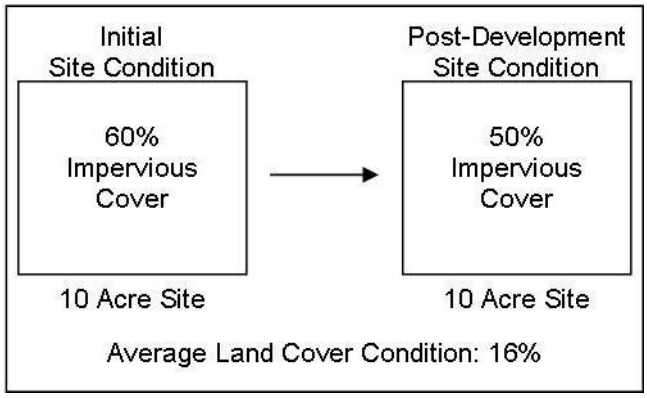
SITUATION 3

Land disturbing activities where the existing percent impervious cover is greater than the average land cover condition.

VSMP Requirement: The pollutant discharge after development shall not exceed 1) the pollutant discharge based on existing conditions less 10%; or 2) the pollutant discharge based on the average land cover condition, whichever is greater.

Special Condition Requirement:

(a) *Redevelopment with an Average Impervious Land Cover Condition of 16% or Less*

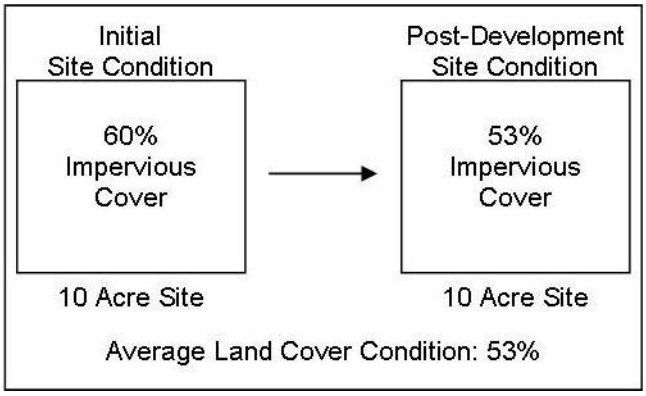


Special Condition Requirement 7: No additional reductions are required because there has not been an *increase* in the load draining from the site.

Special Condition Requirement 8: No additional reductions are required because there has not been an *increase* in the load draining from the site.

NOTE: The permittee may take credit for the 10% reductions and apply it to the existing source reductions required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)). See Appendix V.J for additional information concerning credits for redevelopment.

(b) *Redevelopment with an Average Impervious Land Cover Condition Greater than 16%*



Special Condition Requirement 7: No additional reductions are required because there was *no increase* in loads from the post developed site.

Special Condition Requirement 8: No additional reductions are required because there was *no increase* in loads from the post developed site.

NOTE: The permittee may take credit for the 7.0% reductions and apply it to the existing source reduction required by Special Condition Requirement 6 (GP Section I.C.2.a.(6)). See Appendix V.J for additional information concerning credits for redevelopment.

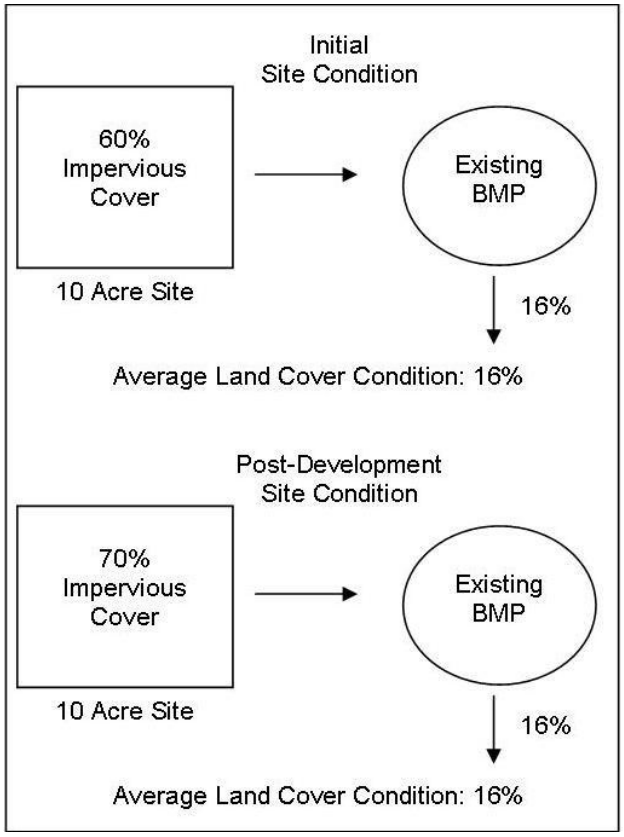
(c) *New Development with an Average Impervious Land Cover Condition of 16% or Less*
This Situation does not apply to new development.

(d) *New Development with an Average Impervious Land Cover Condition Greater than 16%*
This Situation does not apply to new development.

SITUATION 4
Land disturbing activities where the existing percent impervious cover is served by an existing stormwater management BMP(s) that addresses water quality.

VSMP Requirement: The pollutant discharge after disturbance shall not exceed the existing pollutant discharge based on the existing percent impervious cover while served by the existing BMP. The existing BMP shall be shown to have been designed and constructed in accordance with proper design standards and specifications, and to be in proper functioning condition.

Special Condition Requirement:



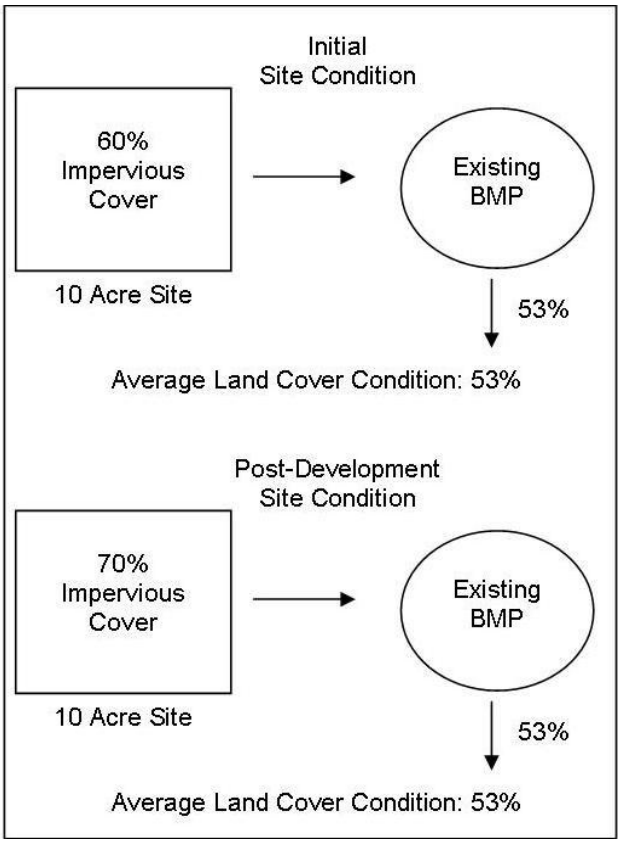
The site drains to an existing stormwater BMP before discharging to an impaired water body. The pollutant load discharged to the receiving stream from the regional BMP is less than or equal to load from a site with an average land cover condition of 16 percent. If the BMP is overdesigned for the current site, it may be possible for redevelopment to result in an increase in impervious cover on the site, but not result in an increased load reaching the stream. If that is the case, additional reductions do not need to be made.

(a) *Redevelopment with an Average Impervious Land Cover Condition of 16% or Less*

Special Condition Requirement 7: No additional reductions are required because the load draining from the BMP to the receiving water body does not increase.

Special Condition Requirement 8: No additional reductions are required because the load draining from the BMP to the receiving water body does not increase.

(b) *Redevelopment with an Average Impervious Land Cover Condition Greater than 16%*



The site drains to an existing stormwater BMP before discharging to an impaired water body. The pollutant load discharged to the receiving stream from the regional BMP is less than or equal to load from a site with an average land cover condition of 53 percent. If the BMP is overdesigned for the current site, it may be possible for redevelopment to result in an increase in impervious cover on the site, but not result in an increased load reaching the stream. If that is the case, additional reductions do not need to be made.

Special Condition Requirement 7: No additional reductions are required because the load draining from the BMP to the receiving water body does not increase.

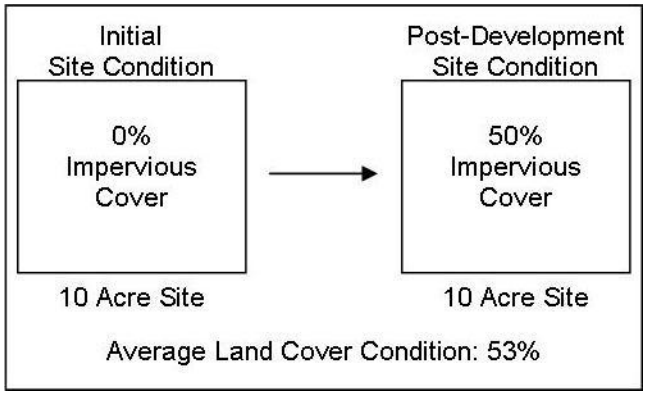
Special Condition Requirement 8: No additional reductions are required because the load draining from the BMP to the receiving water body does not increase.

(c) *New Development with an Average Impervious Land Cover Condition of 16% or Less*
This Situation does not apply to new development.

(d) *New Development with an Average Impervious Land Cover Condition Greater than 16%*
This Situation does not apply to New Development.

EXAMPLE II.1 – Site Specific Calculation to Meet Special Condition Requirement 7 or 8

A permittee in the James River Basin that adopted an average land cover condition of 53% under the Chesapeake Bay Preservation Act needs to calculate the additional reductions required under Special Condition Requirement 7 (GP Section I.C.2.a.(7)) for a 10 acre new development project that initiates construction between July 1, 2009 and June 30, 2014. Once completed, the project will have an average land cover condition of 50%, which is less than the localities adopted average land cover condition.



Step 1: Site Condition as of June 30, 2009 Calculation

The permittee must incorporate the site conditions as of June 30, 2009 into the acreage calculation under Special Condition Requirement 6 (GP Section I.C.2.a.(6)). Once the "existing condition" required reductions are determined using the tables they do not need to be recalculated. In this example, all 10 acres of the pre-development site are pervious regulated acres (there are no forested acres on site).

Step 2: Identifying Additional Reductions under Special Condition 7 or 8

Next the permittee must determine if the project is subject to additional reduction requirements. Referencing Appendix II.1 of this guidance document, the permittee identifies that this project falls under Situation 1.(d). In accordance with Special Condition Requirement 7 (GP Section I.C.2.a.(7)) the permittee must offset 5.0% of the incremental increased load from the impervious cover change down to the statewide average land cover condition of 16% during this permit cycle *in addition* to the reductions required under Special Condition 6.

Step 3: Calculating Additional Required Reductions

The post-development 50% impervious land cover condition has an associated total phosphorous loading of 1.14 lbs TP/ac/yr (calculated using the Simple Method). To calculate the additional offsets that will be necessary for the site the permittee should subtract the phosphorous loading associated with a 16% average impervious land cover condition (0.45 lbs TP/ac/yr) from the calculated load for the higher average land cover condition:

1.14 lbs TP/ac/yr - 0.45 lbs TP/ac/yr = 0.69 lbs TP/ac/yr

During the first permit cycle, the permittee must offset 5.0% of this increased load:

0.69 lbs TP/ac/yr * .05 = 0.0345 lbs TP/ac/yr

Since the project is a 10 acre site, the total pounds that must be offset for this site for this permit cycle is:

10 acre site * 0.0345 lbs/ac/yr = 0.345 lbs TP/yr

The permittee must offset 0.345 lbs TP/yr for this site during this permit term. During the next permit term the permittee will need to offset an additional 35% of the increased load from this project and it is expected that by the end of the third permit cycle the increased loading from these sites will be fully offset.

To calculate the TN loading rate reduction required during this MS4 permit cycle and TSS loading rate reduction required during this MS4 permit cycle, the permittee will need to use the ratio table provided in the permit. For the James River Basin, the POC ratios are those shown in GP Section I.C.2, *Table 4*, an excerpt of which is provided below (*Table II.1*):

Table II.1 – Ratio of Phosphorous Loading Rate to Nitrogen and Total Suspended Solids Loading Rates for the James River Basin[10]

Ratio of Phosphorous to Other POCs (Based on All Land Uses 2009 Progress Run)	Phosphorous Loading Rate (lbs/ac)	Nitrogen Loading Rate (lbs/ac)	Total Suspended Solids Loading Rate (lbs/ac)
James River Basin	1.0	5.2	420.9

To calculate the additional reductions required for TN for this project the permittee first needs to use the conversion table to calculate the lbs TN/ac/yr that must be reduced as a result of 50% impervious land cover condition:

$$.0345 \text{ lbs TP/ac/yr} * \frac{5.2 \text{ lbs TN/ac}}{1.0 \text{ lbs TP/ac}} = 0.179 \text{ lbs TN/ac/yr}$$

The permittee should then calculate the TN offsets that must be made for this 10 acre project:

0.1794 lbs TN/ac/yr * 10 acres = 1.79 lbs TN/yr

Similar calculations must be performed to determine the offsets for total suspended solids loading rate. Again, the permittee first needs to use the conversion table provided in the permit to determine the lbs TSS/ac/yr that must be reduced as a result of 50% impervious land cover condition.

$$0.0345 \text{ lbs TP/ac/yr} * \frac{420.9 \text{ lbs TSS/ac}}{1.0 \text{ lbs TP/ac}} = 14.251 \text{ lbs TSS/ac/yr}$$

The permittee should then calculate the TSS offsets that must be made for this 10 acre project:

14.5211 lbs TSS/ac/yr * 10 acres = 145.21 lbs TSS/yr

For this project, during the first permit cycle, the permittee must offset 0.345 lbs TP/yr, 1.79 lbs TN/yr, and 145.21 lbs TSS/yr. During the next permit term the permittee will need to offset an additional 35% of the

[10] Table and values for the James River Basin can be found in the General Permit or Appendix I of this document

increased load from this project and it is expected that by the end of the third permit cycle the increased loading from these sites will be fully offset.

NOTE: Permittees may report the impact of offsets required under Special Condition 7 and/or 8 to the Department in aggregate. However, the data and calculations performed to determine these numbers should be kept on hand.

EXAMPLE II.2[11] – Aggregate Accounting for Special Condition Requirement 7 or 8

A permittee in the James River Basin has decided to take an aggregate approach to addressing Special Condition Requirement 7. The permittee has 1000 acres of regulated land, which was 50% impervious and 50% pervious as of June 30, 2009. To estimate the POC reductions required under Special Condition Requirement 7, the permittee first needs to calculate the total POC loads as of June 30, 2009. The permittee should use the "2009 EOS Loading Rate" from Table 2a in the permit for this calculation:

Table II.2 – POC Loads as of June 30, 2009 (Pre-Development)

Subsource	Pollutant	Total Existing Acres Served by MS4 as of 06/30/09	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC Load as of 06/30/09
Regulated Urban Impervious	Nitrogen	*500*	9.39	*4695*
Regulated Urban Pervious		*500*	6.99	*3495*
Regulated Urban Impervious	Phosphorus	*500*	1.76	*880*
Regulated Urban Pervious		*500*	0.5	*250*
Regulated Urban Impervious	Total Suspended Solids	*500*	676.94	*338,470*
Regulated Urban Pervious		*500*	101.08	*50,540*

As of July 1, 2014 the permittee determines using GIS resources that, as a result of "new sources," the proportion of regulated urban pervious acres to regulated urban impervious acres has changed. The permittee should determine the "post-development" loading rates as a result of the land use change. Again, the "2009 EOS Loading Rate" from Table 2a should be used for this calculation:

Table II.3 - Post-Development Conditions July 1, 2014

Subsource	Pollutant	Total Existing Acres Served by MS4 (07/01/14)	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC Load as of 07/01/14
Regulated Urban Impervious	Nitrogen	*600*	9.39	*5634*
Regulated Urban Pervious		*400*	6.99	*2796*
Regulated Urban Impervious	Phosphorus	*600*	1.76	*1056*
Regulated Urban Pervious		*400*	0.5	*200*
Regulated Urban Impervious	Total Suspended Solids	*600*	676.94	*406,164*
Regulated Urban Pervious		*400*	101.08	*40,432*

[11] **NOTE**: This aggregate method does not differentiate between projects greater than or less than an acre nor does it account for average land use cover condition for the implementation of post-development stormwater management facilities. Instead it captures all changes in regulated urban impervious and regulated urban pervious loads. Permittees may submit alternative aggregate accounting strategies, but they must ensure that the submitted method captures all additional reductions required under Special Condition Requirement 7 (GP Section I.C.2.a.(7)).

The permittee should then calculate the difference between the post-development and pre-development land cover condition to estimate the Total Load Change (Regulated Urban Impervious Load Change + Regulated Urban Pervious Load Change).

Table II.4 – Total Load Change from "New Sources" between June 30, 2009 and July 1, 2014

Subsource	Pollutant	Estimated Total POC Load as of 07/01/14 (lbs/yr)	Estimated Total POC Load as of 06/30/09 (lbs/yr)	Load Change (lbs/yr)	Total Load Change (lbs/yr)
Regulated Urban Impervious	Nitrogen	*5634*	*4695*	939	
Regulated Urban Pervious		*2796*	*3495*	-699	240
Regulated Urban Impervious	Phosphorus	*1056*	*880*	176	
Regulated Urban Pervious		*200*	*250*	-50	126
Regulated Urban Impervious	Total Suspended Solids	*406,164*	*338,470*	67,694	
Regulated Urban Pervious		*40,432*	*50,540*	-10,108	57,586

The permittee should also take into account BMPs that were installed on site during the development or redevelopment process to meet other VSMP requirements. The POC loads treated by those BMPs should be subtracted from the Total Load Change.

Table II.5 – Net Load Change (Total Load Change – Reductions from implemented BMPs)

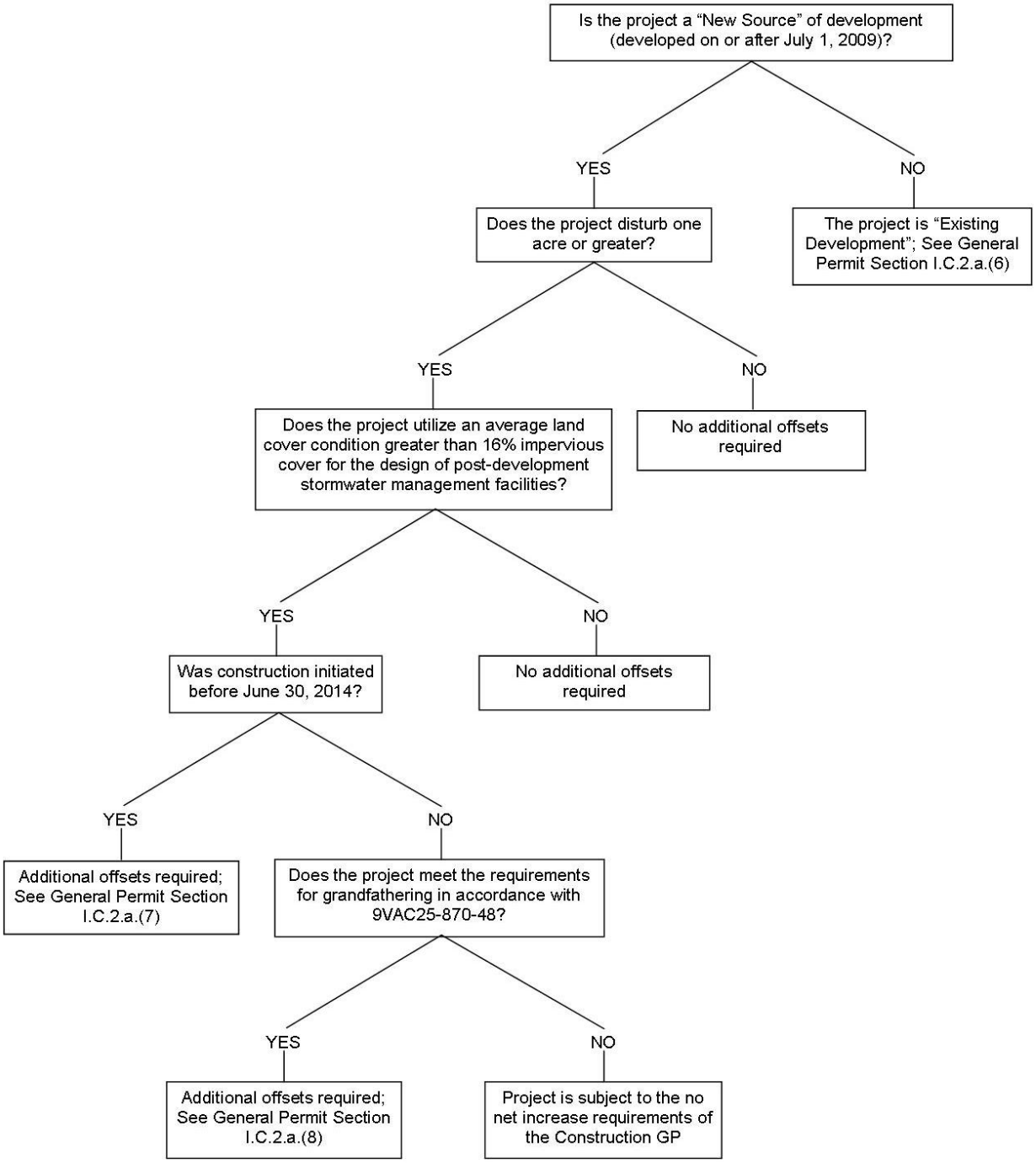
Pollutant	Total Load Change (lbs/yr)	Reductions from on-site BMPs (lbs/yr)	Net Load Change (lbs/yr)
Nitrogen	240	100	140
Phosphorus	126	25	101
Total Suspended Solids	57,586	20,000	37,586

The final column of Table II.5 represents the additional load from New Sources between June 30, 2009 and July 1, 2014 that must be offset. During the first permit cycle, the permittee will need to offset 5.0% of the calculated "Net Load Change."

Pollutant	Net Load Change (lbs/yr)	Required Reduction during first permit cycle	Additional Reductions Required during first permit cycle (lbs/yr)
Nitrogen	140	0.05	7
Phosphorous	101	0.05	5.05
Total Suspended Solids	37,586	0.05	1879.3

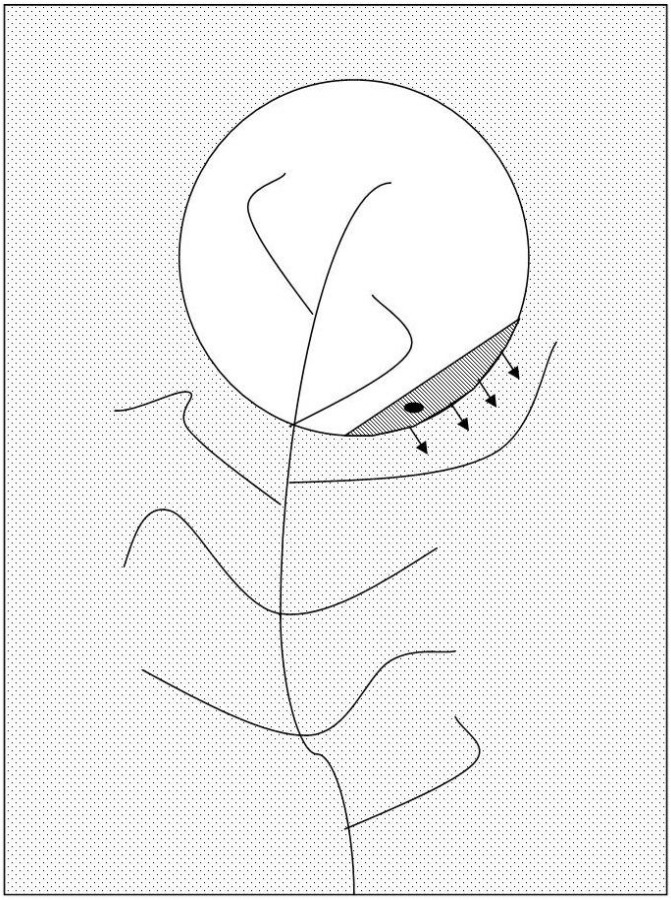
Although this was not the case in this example, if the total load change for any pollutant represents a reduction, the permittee may take credit for the difference and apply it towards the reduction requirements for existing sources.

APPENDIX III – PERMIT POC LOAD REDUCTION FLOW CHART



APPENDIX IV – MS4 BOUNDARY DIAGRAMS

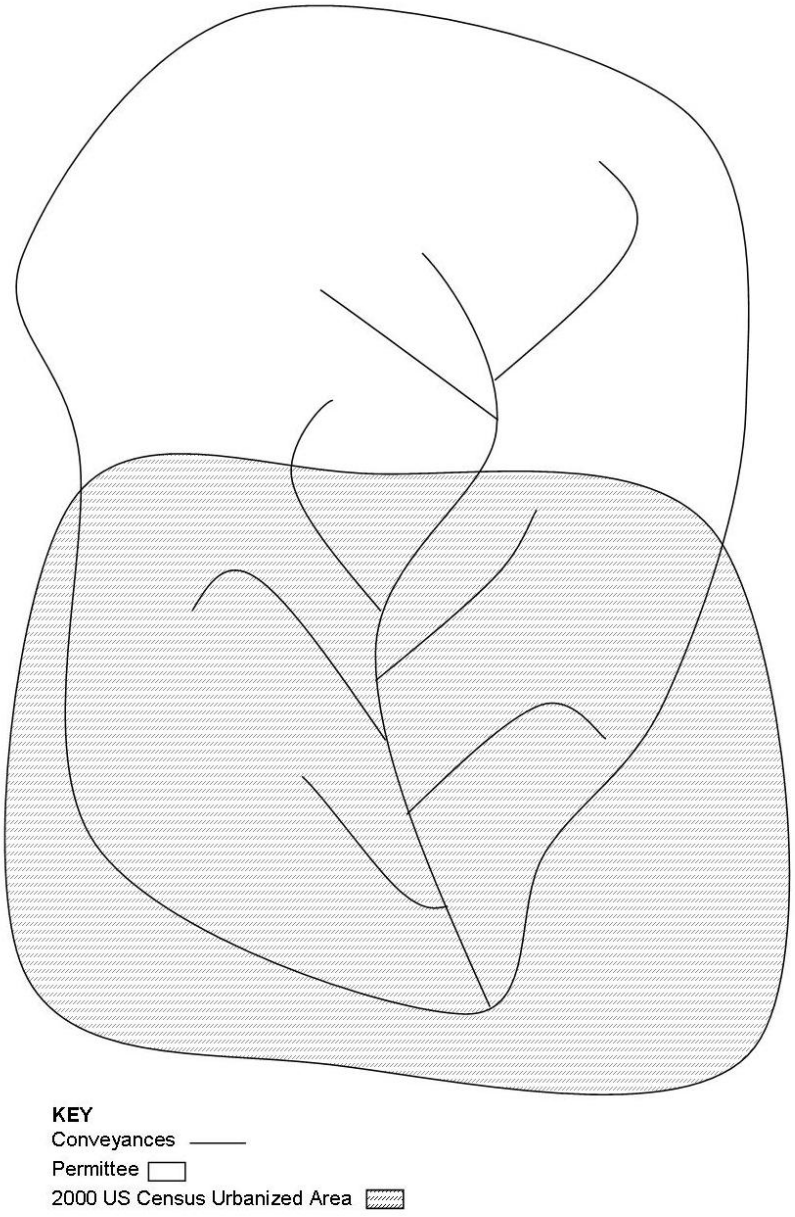
EXAMPLE IV.1 – OVERLAPPING DRAINAGE AREAS



In accordance with GP Section I.C.2.(5) permittees must determine the existing acres *served* by the MS4. The system's service area includes those acres that drain to the permittee's system. Permittee B is located within Permittee A's land area and both permittees are located entirely within a Census Designated Urbanized Area. A portion of Permittee B's land area drains, through sheetflow, to Permittee A's system. Although the shaded drainage area is located within Permittee B's jurisdiction, Permittee A is responsible for the POC loads draining from that land. Alternatives to this approach will be considered as long as all lands are accounted for in reduction calculations.

However, if Permittee B installs a BMP within the shaded Drainage Area, they will receive credit for reductions from the BMP. Regardless, it is highly recommended that permittee's work together to reduce POC loads in these instances.

EXAMPLE IV.2 – JURISDICTION EXTENDS BEYOND URBANIZED AREA



A portion of the Phase II permittee's system falls outside of the 2000 US Census Urbanized Area. The Phase II permittee is not responsible for any land area draining to the portion of their system that falls outside the Urbanized Area.

APPENDIX V – CALCULATION METHODOLOGIES

Appendix V.A – Structural BMPs, Methodology I – Virginia Stormwater Clearinghouse BMPs

Appendix V.B – Structural BMPs, Methodology II – Bay Program Retrofit Curves

Appendix V.C – Structural BMPs, Methodology III – Bay Program Established Efficiencies

Appendix V.D – Structural BMPs, Methodology IV – BMP Enhancements and Conversions

Appendix V.E – Structural BMPs, Methodology V – BMP Treatment Trains

Appendix V.F – Land Use Changes

Appendix V.G – Forest Buffers

Appendix V.H – Urban Stream Restoration

Appendix V.I – Urban Nutrient Management

Appendix V.J - Redevelopment

APPENDIX V.A – Virginia Stormwater Clearinghouse BMPs[12]

To be eligible for these efficiencies, the BMP must meet all the design requirements that are listed in the Virginia Stormwater BMP Clearinghouse's technical specification for that BMP, not just the one inch requirement for runoff depth treated. There are no established efficiencies for suspended solids in the Virginia Stormwater BMP Clearinghouse. To calculate the suspended solid reductions, permittees should use the retrofit curves developed by the Bay Program. The methodology for using the retrofit curves is detailed in *Appendix V.B*. For additional information about the Virginia Stormwater BMP Clearinghouse requirements, permittees should see the BMP design standards and specs, which can be found at http://vwrrc.vt.edu/swc/StandardsSpecs.html.

Table V.A.1 - Virginia Stormwater BMP Clearinghouse BMPs, Established Efficiencies

Practice Number	Practice	TN	TP
1	Rooftop Disconnection[13]	25% or 50%[1]	25% or 50%[1]
2	Sheetflow to Vegetated Filter or Conserved Open Space 1	25% or 50%[1]	25% or 50%[1]
	Sheetflow to Vegetated Filter or Conserved Open Space 2	50% or 75%[1]	50% or 75%[1]
3	Grass Channel	28%	23%
5	Vegetated Roof 1	45%	45%
	Vegetated Roof 2	60%	60%
6	Rainwater Harvesting[13]	Up to 90%	Up to 90%
7	Permeable Pavement 1	59%	59%
	Permeable Pavement 2	81%	81%
8	Infiltration 1	57%	63%
	Infiltration 2	92%	93%
9	Bioretention 1	64%	55%
	Bioretention 2	90%	90%
	Urban Bioretention	64%	55%
10	Dry Swale 1	55%	52%
	Dry Swale 2	74%	76%
11	Wet Swale 1	25%	20%
	Wet Swale 2	35%	40%
12	Filtering Practice 1	30%	60%
	Filtering Practice 2	45%	65%
13	Constructed Wetland 1	25%	50%
	Constructed Wetland 2	55%	75%
14	Wet Pond 1	30% (20%)[2]	50% (45%)[2]
	Wet Pond 2	40% (30%)[2]	75% (65%)[2]
15	Extended Detention Pond 1	10%	15%
	Extended Detention Pond 2	24%	31%

[1]Lower rate is for HSG soils C and D, Higher rate is for HSG soils A and B
[2]Lower nutrient removal in parentheses apply to wet ponds in coastal plain terrain

[12] These efficiencies are up to date as of the publication of this guidance. The most up to date list of approved BMPs and their efficiencies can be found on the Virginia Stormwater BMP Clearinghouse website. If there is a discrepancy between this table and the website, the efficiencies on the website supersede those listed in this table. The TN efficiencies may be found in the bodies of the individual BMP reports.

[13] **NOTE:** There are no Bay Program equivalent efficiency BMPs for Rooftop Disconnection and Rainwater Harvesting. Permittees must use the VA Stormwater Clearinghouse technical criteria and efficiencies to receive credit for these practices.

EXAMPLE V.A.1

A small Phase II MS4 with 1000 acres of regulated urban impervious surface and 1000 acres of regulated urban pervious surface is located in the James River Basin. The permittee is planning to implement a constructed wetland that will treat a 50 acre site that is 40% impervious surface and 60% pervious surface.

Prior to considering this project, the permittee has filled out Tables 2a and 3a in their permit, which are incorporated into this example for reference. The permittee will use the loading rates in Table 2a to determine the loads draining to the proposed BMP.

Calculation Sheet for Estimating Existing Source Loads for the James River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre)[1]	Estimated Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Nitrogen	*1000*	9.39	*9390*
Regulated Urban Pervious		*1000*	6.99	*6990*
Regulated Urban Impervious	Phosphorus	*1000*	1.76	*1760*
Regulated Urban Pervious		*1000*	0.5	*500*
Regulated Urban Impervious	Total Suspended Solids	*1000*	676.94	*676,940*
Regulated Urban Pervious		*1000*	101.08	*101,080*

[1]This loading rate can be found in Table 2 a of the General Permit

The second table(s) in the permit must be used to calculate the required reduction for the first permit cycle. This calculation will provide the necessary reductions for the first permit cycle in pounds:

Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the James River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre)[1]	Total Reduction Required First Permit Cycle (lbs)
Regulated Urban Impervious	Nitrogen	*1000*	0.04	*40*
Regulated Urban Pervious		*1000*	0.02	*20*
Regulated Urban Impervious	Phosphorus	*1000*	0.01	*10*
Regulated Urban Pervious		*1000*	0.002	*2*
Regulated Urban Impervious	Total Suspended Solids	*1000*	6.67	*6670*
Regulated Urban Pervious		*1000*	0.44	*440*

[1]This loading rate can be found in Table 3 a in the General Permit

Based on the calculations in the table, the permittee must achieve reductions of 60 lbs TN, 12 lbs TP, and 7110 lbs TSS within the first permit cycle. Although this table divides the loads by regulated impervious and regulated pervious, the efficiencies calculated using the curves are applied to the entire drainage area, not just its impervious acres. The MS4 intends to offset a portion of this load by installing a constructed wetland to treat a 50 acre site that is 40% impervious (20 acres) and 60% pervious (30 acres).

The BMP being installed meets all the design requirements for the Virginia Stormwater BMP Clearinghouse "Constructed Wetland #1," which has a TN reduction efficiency of 25% and a TP reduction efficiency of 50% (*Table V.A 1*). The BMP's efficiency can be translated into pounds by first calculating the site's POC loading without the BMP. Recall that the BMP is being installed to treat land that is 20 acres impervious and 30 acres pervious surface. The acres should be multiplied by the 2009 EOS loading rate for the appropriate basin (*Appendix I, Table 2a)*. For instance, to estimate the nitrogen reductions provided by the constructed wetland for the impervious surface:

$$20\ acres * \ 9.39\ lbs\ TN/ac/yr = \ 187.8\ lbs\ T/yr$$

and for pervious surface:

$$30\ acres * \ 6.99\ lbs\ TN/ac/yr = \ 209.7\ lbs\ TN/yr$$

These TN reduction values should be multiplied by the TN efficiency for a constructed wetland as provided in *Table V.A.1*.

$$187.8\ \ lbs\ TN/yr\ * \ 0.25\ = \ 46.95\ lbs\ TN/yr$$

$$209.7\ lbs\ TN/yr * \ 0.25 = \ 52.43\ lbs\ TN/yr$$

Therefore, the total nitrogen reduction from the constructed wetland is:

$$46.95\ lbs\ TN/yr + \ 52.43\ lbs\ TN/yr = \ 99.38\ lbs\ TN/yr$$

With the installation of this BMP, the permittee has reduced its annual load of nitrogen by 99.38 lbs. With this BMP the permittee has met the reduction requirements for the first permit cycle for nitrogen. The reductions that are achieved for TP can be calculated using the same methodology. To calculate the reductions for TSS, see *Appendix V.B.*

APPENDIX V.B – Chesapeake Bay Program, Retrofit Curves

This credit calculation method should be used when a BMP cannot meet the Virginia Stormwater BMP Clearinghouse criteria. To use the retrofit curves, the permittee must first estimate the runoff depth treated per impervious acre by the BMP. This can be done using the following equation:

$$RD = \frac{(RS)(12)}{IA}$$

Where

RD = Runoff Depth Treated (inches)
RS = Runoff Storage (acre-feet)
IA = Impervious Acres (acres)

Runoff Storage can be estimated by the engineer designing the BMP or, for sediment, using the BMP appropriate "Runoff Reduction (cf)" cell from the DA tab in the Runoff Reduction Method spreadsheet for the BMPs that are in the Virginia Stormwater BMP Clearinghouse. The appropriate spreadsheets may be found on the Department's website on the Stormwater Management Guidance page.

BMPs are categorized as either a Runoff Reduction (RR) Practice or a Stormwater Treatment (ST) Practice (*Table V.B.1)*. Once the runoff depth treated (x-axis) and BMP type are defined, the user will be able to estimate the total removal percentage using the curves.

Table V.B.1 - BMP Characterization for Nutrient Curves

Runoff Reduction Practices (RR)	Stormwater Treatment Practices (ST)
Site Design/Non-Structural Practices	Constructed Practices
Landscape Restoration/Reforestation	Constructed Wetlands
Riparian Buffer Restoration	Filtering Practices (aka Constructed Filters, Sand Filters, Stormwater Filtering Systems)
Rooftop Disconnection (aka Simple Disconnection to Amended Soils, to a Conservation Area, to a Pervious Area, Non-Rooftop Disconnection)	Proprietary Practices (aka Manufactured BMPs)
Sheetflow to Filter/Open Space* (aka Sheetflow to Conservation Area, Vegetated Filter Strip)	Wet Ponds (aka Retention Basin)
All Environmental Site Design BMPS	Wet Swale
Constructed Practices	
Bioretention or Rain Garden (Standard or Enhanced)	
Dry Swale	
Expanded Tree Pits	
Grass Channels (w/ Soil Amendments, aka Bio-swale, Vegetated Swale)	
Green Roof (aka Vegetated Roof)	
Green Streets	
Infiltration (aka Infiltration Basin, Infiltration Bed, Infiltration Trench, Dry Well/Seepage Pit, Landscape Infiltration)	
Permeable Pavement (aka Porous Pavement)	
Rainwater Harvesting (aka Capture and Re-use)	
*May include a berm or a level spreader	

In order to calculate the pounds reduced by a given BMP, the permittee will need to multiply the BMP's efficiency (%) by the appropriate loading rate provided in the permit and acres treated (*See Example V.B.1)*

More information concerning the curves can be found in the Bay Program's:

- *Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects*, October 2012, at: http://www.chesapeakebay.net/documents/Final_CBP_Approved_Expert_Panel_Report_on_Stormwater_Retrofits--_long.pdf

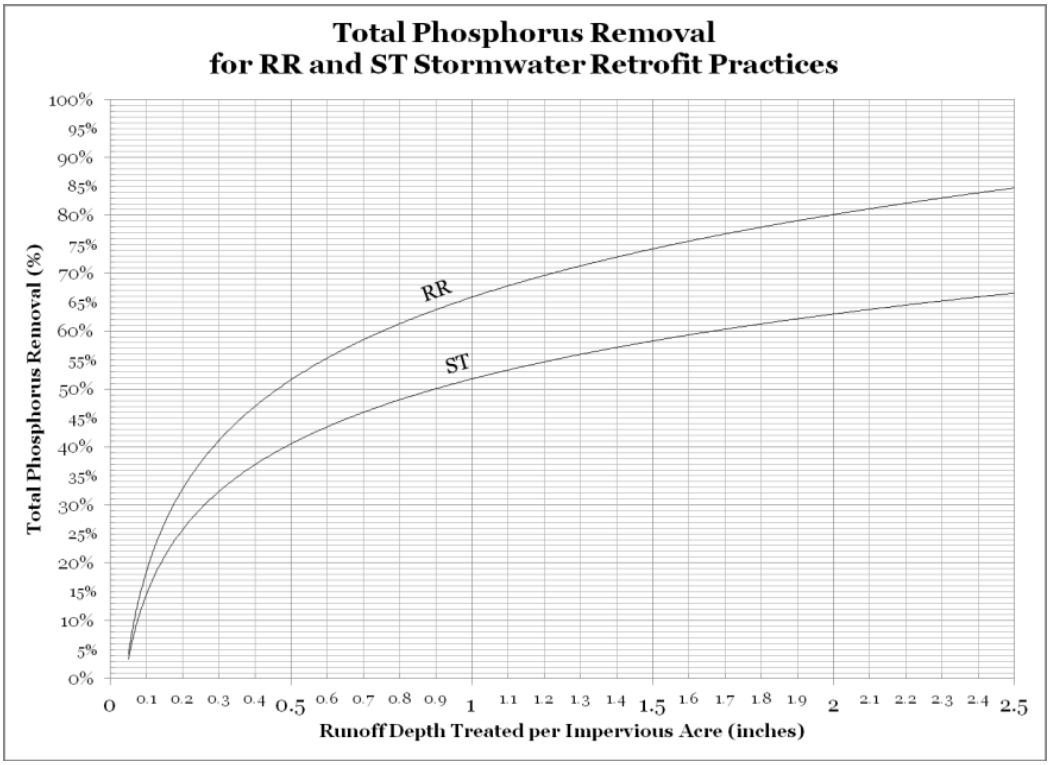


Figure 1 - Retrofit Pollutant Removal Adjustor Curve for Total Phosphorous (TP)

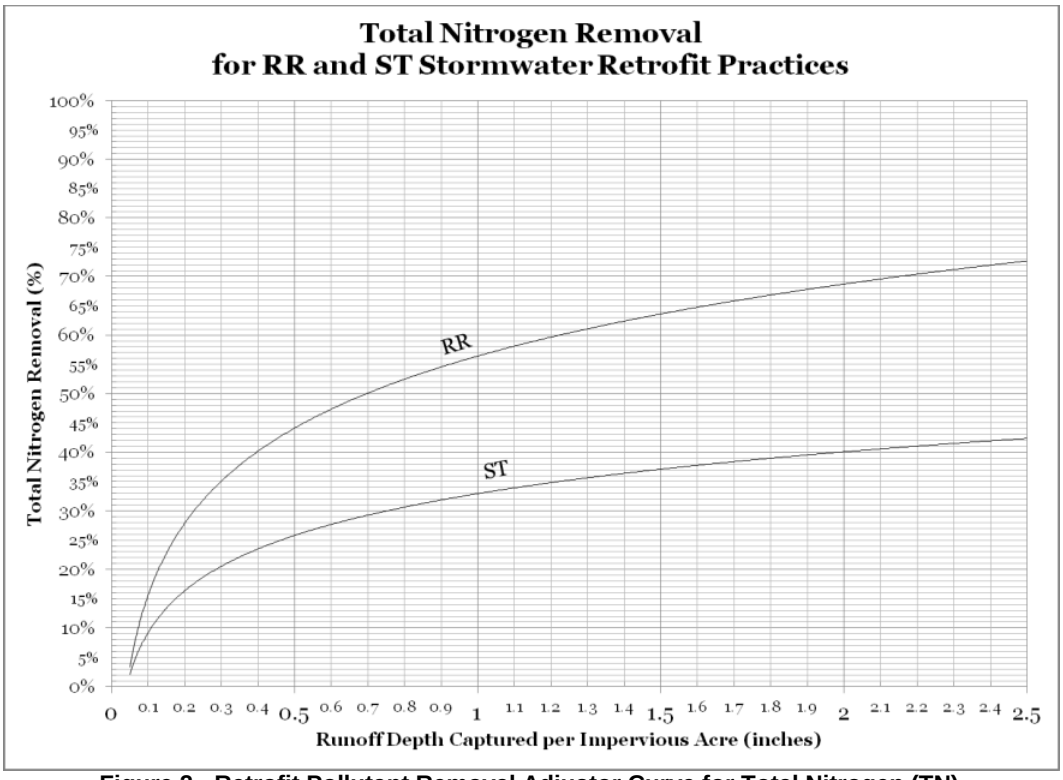


Figure 2 - Retrofit Pollutant Removal Adjustor Curve for Total Nitrogen (TN)

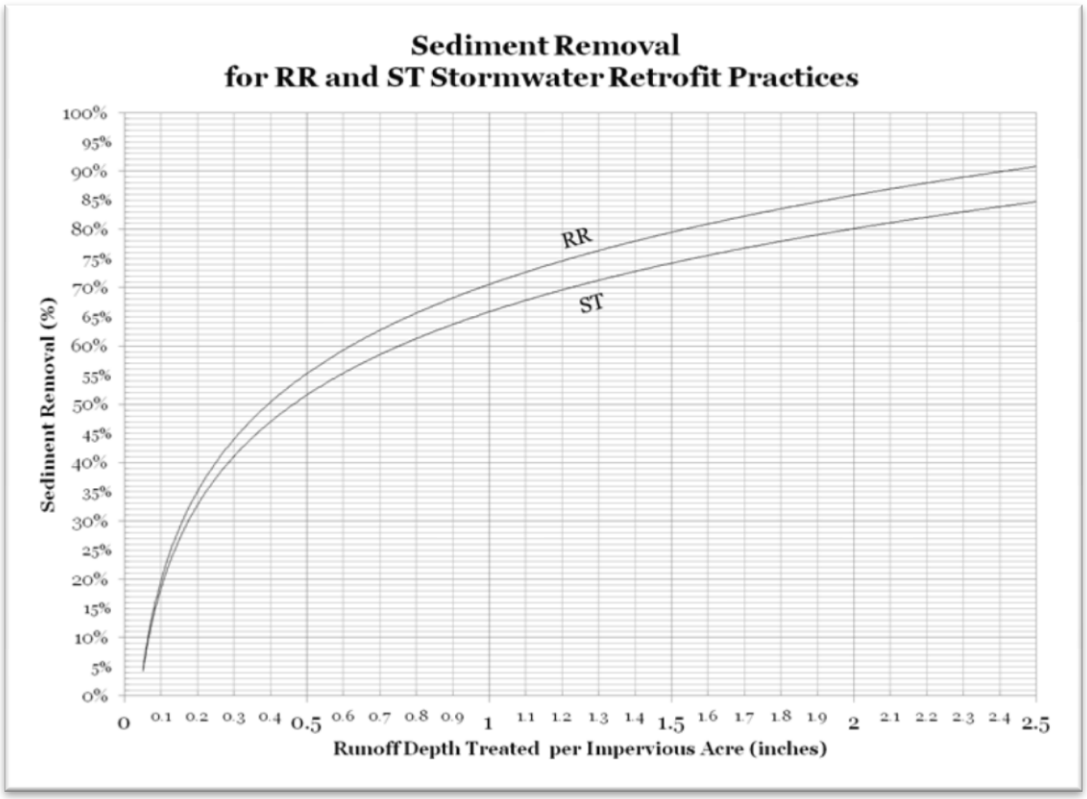


Figure 3 - Retrofit Pollutant Removal Adjustor Curve for Total Sediment (Suspended Solids)

EXAMPLE V.B.1

A small Phase II MS4 with 1000 acres of regulated urban impervious surface and 1000 acres of regulated urban pervious surface is located in the James River Basin. A constructed wetland is planned to treat a 50 acre site that is 40% impervious surface and 60% pervious surface.

Prior to considering this project, the permittee has filled out Tables 2a and 3a in their permit, which are incorporated into this example for reference. The permittee will use the loading rates in Table 2a to determine the loads draining to the proposed BMP.

Calculation Sheet for Estimating Existing Source Loads for the James River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre)[1]	Estimated Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Nitrogen	*1000*	9.39	*9390*
Regulated Urban Pervious		*1000*	6.99	*6990*
Regulated Urban Impervious	Phosphorus	*1000*	1.76	*1760*
Regulated Urban Pervious		*1000*	0.5	*500*
Regulated Urban Impervious	Total Suspended Solids	*1000*	676.94	*676,940*
Regulated Urban Pervious		*1000*	101.08	*101,080*

[1]This loading rate can be found in 9VAC25-890-40 Section I.C Table 2-a of the General Permit

The second table(s) in the permit must be used to calculate the required reduction for the first permit cycle. This calculation will provide the necessary reductions for the first permit cycle in pounds:

Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the James River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre)[1]	Total Reduction Required First Permit Cycle (lbs)
Regulated Urban Impervious	Nitrogen	*1000*	0.04	*40*
Regulated Urban Pervious		*1000*	0.02	*20*
Regulated Urban Impervious	Phosphorus	*1000*	0.01	*10*
Regulated Urban Pervious		*1000*	0.002	*2*
Regulated Urban Impervious	Total Suspended Solids	*1000*	6.67	*6670*
Regulated Urban Pervious		*1000*	0.44	*440*

[1]This loading rate can be found in 9VAC25-890-40 Section I.C Table 3-a in the General Permit

Based on the calculations in the table, the permittee must achieve reductions of 60 lbs TN, 12 lbs TP, and 7110 lbs TSS within the first permit cycle. Although this table divides the loads by regulated urban impervious acres and regulated urban pervious acres, the efficiencies calculated using the curves are applied to the entire drainage area, not just its impervious acres. The MS4 intends to offset a portion of this load by installing a constructed wetland to treat a 50 acre site that is 40% impervious (20 acres) and 60% pervious (30 acres).

A constructed wetland is an efficiency BMP. As recommended in the guidance, the permittee intends to use the retrofit curves to calculate the percent removal accomplished by the BMP. To do this, the permittee needs to estimate (1) the BMP's runoff storage in acre-feet and (2) the number of impervious acres draining to the BMP. Using the runoff reduction method spreadsheet, it is calculated that the runoff storage of the BMP is 1.25 acre-feet. The runoff depth can be estimated using the Runoff Depth Treated equation:

$$\frac{(1.25\ acre-feet)(12)}{20\ acres} = 0.75\ inch$$

The runoff depth treated by the constructed wetland is 0.75 inch. From there, the retrofit curves can be used to estimate the removal efficiencies for TP, TN, and TSS. Based on *Table V.B.1* the permittee determines that constructed wetlands are a stormwater treatment (ST) BMP. Using the curves in *Figures 1, 2, and 3,* the permittee estimates that the removal rates are:

TN	TP	TSS
30%	47%	60%

The BMP's efficiency can be translated into pounds by first calculating the site's POC loading without the BMP. Recall that the BMP is being installed to treat land that is 20 acres impervious and 30 acres pervious surface. The acres should be multiplied by the 2009 EOS loading rate for the appropriate basin (*Appendix I, Table 2a)*. For instance, to estimate the nitrogen reductions provided by the constructed wetland for the impervious surface:

$$20\ acres * 9.39\ lbs\ TN/ac/yr = 187.8\ lbs\ TN/yr$$

and for pervious surface:

$$30\ acres * 6.99\ lbs\ TN/ac/yr = 209.7\ lbs\ TN/yr$$

These values should be multiplied by the efficiency for TN that was calculated above.

$$187.8\ lbs\ TN/yr * 0.30 = 56.34\ lbs\ TN/yr$$

$$209.7\ lbs\ TN/yr * 0.30 = 62.91\ lbs\ TN/yr$$

Therefore, the TN reduction from the constructed wetland is:

$$56.34\ lbs\ TN/yr + 62.91\ lbs\ TN/yr = 119.25\ lbs\ TN/yr$$

With the installation of this BMP, the permittee has reduced its annual load of nitrogen by 119.25 lbs. With this BMP the permittee has met the reduction requirements for the first permit cycle for nitrogen. The reductions that are achieved for the other POC can be calculated using the same procedure.

APPENDIX V.C - Chesapeake Bay Program, Established Efficiencies

As an alternative to using the Bay Program Curves, permittees may use the Bay Program's established efficiencies for BMPs. Again, these efficiencies may be used for BMPs that do not meet the Virginia Stormwater BMP Clearinghouse design specifications.

Table V.C.1 – Chesapeake Bay Program BMPs, Established Efficiencies

Chesapeake Bay Program BMPs	TN	TP	TSS
Wet Ponds and Wetlands	20%	45%	60%
Dry Detention Ponds and Hydrodynamic Structures	5%	10%	10%
Dry Extended Detention Ponds	20%	20%	60%
Infiltration Practices w/o Sand, Veg.	80%	85%	95%
Infiltration Practices w/ Sand, Veg.	85%	85%	95%
Filtering Practices	40%	60%	80%
Bioretention C/D soils, underdrain	25%	45%	55%
Bioretention A/B soils, underdrain	70%	75%	80%
Bioretention A/B soils, no underdrain	80%	85%	90%
Vegetated Open Channels C/D soils, no underdrain	10%	10%	50%
Vegetated Open Channels A/B soils, no underdrain	45%	45%	70%
Bioswale	70%	75%	80%
Permeable Pavement w/o Sand, Veg. C/D soils, underdrain	10%	20%	55%
Permeable Pavement w/o Sand, Veg. A/B soils, underdrain	45%	50%	70%
Permeable Pavement w/o Sand, Veg. A/B soils, no underdrain	75%	80%	85%
Permeable Pavement w/Sand, Veg. C/D soils, underdrain	20%	20%	55%
Permeable Pavement w/Sand, Veg. A/B soils, underdrain	50%	50%	70%
Permeable Pavement w/Sand, Veg. A/B soils, no underdrain	80%	80%	85%
Street Sweeping Mass Reduced per pound of sediment swept	0.18%	0.07%	100%

BMP efficiencies for wetland restoration vary depending on hydrogeomorphic region as listed below in *Table V.C.2*. To use this table the permittee will need to determine which region their MS4 is in and use the appropriate efficiency. If the permittee is unsure which Hydrogeomorphic Region it is located in, resources are available through the USGS at http://chesapeake.usgs.gov/data.html.

Table V.C.2 – Chesapeake Bay Program BMPs, Established Efficiencies Regionally Impacted

Chesapeake Bay Program Hydrogeomorphic Region affected efficiencies				
BMPs	Region	TN	TP	TSS
Wetland Restoration	Appalachian Plateau Siliciclastic Non-Tidal	7.0%	12%	4.0%
Wetland Restoration	Coastal Plain Dissected Uplands Non-Tidal; Coastal Plain Dissected Uplands Tidal; Coastal Plain Lowlands Tidal; Coastal Plain Uplands Tidal; Coastal Plain Lowlands Non-Tidal; Coastal Plain Uplands Non-Tidal	25%	50%	15%
Wetland Restoration	Blue Ridge Non-Tidal; Mesozoic Lowlands Non-Tidal; Valley and Ridge Carbonate Non-Tidal; Piedmont Crystalline Non-Tidal; Piedmont Carbonate Non-Tidal; Valley and Ridge Siliciclastic Non-Tidal	14%	26%	8.0%

EXAMPLE V.C.1

A small Phase II MS4 with 1000 acres of regulated urban impervious surface and 1000 acres of regulated urban pervious surface is located in the James River Basin. A bioswale is planned to treat a 5 acre site that is 40% impervious surface and 60% pervious surface.

Prior to considering this project, the permittee has filled out Tables 2a and 3a in their permit, which are incorporated into this example for reference. The permittee will use the loading rates in Table 2a to determine the loads draining to the proposed BMP.

Calculation Sheet for Estimating Existing Source Loads for the James River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre)[1]	Estimated Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Nitrogen	*1000*	9.39	*9390*
Regulated Urban Pervious		*1000*	6.99	*6990*
Regulated Urban Impervious	Phosphorus	*1000*	1.76	*1760*
Regulated Urban Pervious		*1000*	0.5	*500*
Regulated Urban Impervious	Total Suspended Solids	*1000*	676.94	*676,940*
Regulated Urban Pervious		*1000*	101.08	*101,080*

[1]This loading rate can be found in 9VAC25-890-40 Section I.C Table 2-a of the General Permit

The second table(s) in the permit must be used to calculate the required reduction for the first permit cycle. This calculation will provide the necessary reductions for the first permit cycle in pounds:

Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the James River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre)[1]	Total Reduction Required First Permit Cycle (lbs)
Regulated Urban Impervious	Nitrogen	*1000*	0.04	*40*
Regulated Urban Pervious		*1000*	0.02	*20*
Regulated Urban Impervious	Phosphorus	*1000*	0.01	*10*
Regulated Urban Pervious		*1000*	0.002	*2*
Regulated Urban Impervious	Total Suspended Solids	*1000*	6.67	*6670*
Regulated Urban Pervious		*1000*	0.44	*440*

[1]This loading rate can be found in 9VAC25-890-40 Section I.C Table 3-a in the General Permit

Based on the calculations in the table, the permittee must achieve reductions of 60 lbs TN, 12 lbs TP, and 7110 lbs TSS within the first permit cycle. Although this table divides the loads by regulated urban impervious acres and regulated urban pervious acres, the efficiencies calculated using the curves are applied to the entire drainage area, not just its impervious acres. The MS4 intends to offset a portion of this load by installing a bioswale to treat a 5 acre site that is 40% impervious (2 acres) and 60% pervious (3 acres).

The BMP's efficiency can be translated into pounds by first calculating what the site's POC loading would be without the BMP. Recall that the BMP is being installed to treat land that is 2 acres impervious and 3 acres pervious surface. The acres should be multiplied by the 2009 EOS loading rate for the appropriate basin (*Appendix I, Table 2a)*. For instance, to estimate the nitrogen reductions provided by the constructed wetland for the impervious surface:

$$2\ acres * \ 9.39\ lbs\ TN/ac/yr = \ 18.78\ lbs\ TN/yr$$

and for pervious surface:

$$3\ acres * \ 6.99\ lbs\ TN/ac/yr = \ 20.97\ lbs\ TN/yr$$

These values should be multiplied by the efficiency for TN that was calculated above.

$$18.78\ \ lbs\ TN/yr\ * \ 0.70\ = \ 13.15\ lbs\ TN/yr$$

$$20.97\ lbs\ TN/yr * \ 0.70 = \ 14.68\ lbs\ TN/yr$$

Therefore, the total nitrogen reduction from the bioswale is:

$$13.15\ lbs\ TN/yr + \ 14.68\ lbs\ TN/yr = \ 27.83\ lbs\ TN/yr$$

With the installation of this BMP, the permittee has reduced its annual load of nitrogen by 27.83 lbs. The permittee will need to implement additional BMPs to reduce the remaining 32.17 lbs of nitrogen. The reductions that are achieved for the other POC can be calculated using the same procedure.

APPENDIX V.D – BMP ENHANCEMENTS & CONVERSIONS

The credit permittees will receive for both BMP Enhancements and Conversions should be calculated using an incremental rate (enhanced BMP efficiency minus existing BMP efficiency). For these calculations either the Bay Program retrofit curves or established efficiencies should be used. The permittee should apply the difference between the existing BMPs efficiency and the enhanced or converted BMP's efficiency to the load that is draining to the BMP to calculate the POC reduction that will be credited.

Although the *Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects* also lists some scenarios where permittees may receive credit for BMP restoration, any reduced capacity that is the result of routine maintenance not being performed will not qualify for credit.

EXAMPLE V.D.1

The same small MS4 is planning to convert a Dry Extended Detention Pond to a Wet Pond. A 10 acre site that is 50% impervious (5 acres) and 50% pervious (5 acres) drains to the existing Pond and the planned upgrades will not alter the BMP's drainage area. Using the same method that was used in *Example V.A.1* and *Example V.B.1* the permittee calculates that the loads draining to the pond are:

for impervious surface:

$$5\ acres * \ 9.39\ lbs\ TN/ac/yr = \ 46.95\ lbs\ TN/yr$$

and for pervious surface:

$$5\ acres * \ 6.99\ lbs\ TN/ac/yr = \ 34.95\ lbs\ TN/yr$$

To calculate the credits for this conversion, the permittee first needs to estimate the removal efficiency of the existing Dry Extended Detention pond. The initial pond was not built to meet VA Stormwater BMP Clearinghouse standards, so the permittee chooses to use the accepted Bay Program Efficiencies as its starting point. For Dry Extended Detention Ponds the accepted Bay Program removal efficiencies are:

TN	TP	TSS
20%	20%	60%

Next the permittee must estimate the efficiency of the wet pond that will result from the conversion. For this the permittee elects to use the Bay Program Curves since, as the result of design constraints, the newly converted pond cannot meet all of the Clearinghouse standards for that BMP type. Using the same process described in *Appendix V.B* the permittee estimates the new wet pond will have a runoff depth treated of one inch. Since Wet Ponds are a ST practice, the permittee uses the provided curves to estimate that the pollutant removal rates are:

TN	TP	TSS
33%	52%	66%

To determine the credits, the permittee must subtract the efficiencies from the existing dry pond from the efficiencies for the new wet pond.

For TN

$$33\% - 20\% = 13\%$$

So for the nitrogen loads draining to the new wet pond the permittee will receive credit for reductions of 13 percent.

$$46.95\ lbs\ TN/yr\ *\ 0.13\ =\ 6.104\ lbs\ TN/yr$$

$$34.95\ lbs\ TN/yr *\ 0.13 =\ 4.544\ lbs\ TN/yr$$

The conversion results in a total increased reduction of 10.65 lbs TN/yr. The interim efficiencies and pollutant reductions can be calculated using the same method for the other POC.

EXISTING BMP EFFICIENCY MODIFICATION

If the BMP being enhanced or converted is missing major design elements or is substantially undersized the permittee may modify the "existing BMP efficiency" that is used to calculate the incremental rate. This may be especially important for Dry Detention Ponds and Dry Extended Detention Ponds. Permittees will need to exercise their best professional judgment if applying a modification to an existing BMP. To receive credit for this type of modification, permittees should submit the appropriate supporting documentation to the Department for approval. All documentation supporting that modification should also be made available to the Department for verification upon request.

A Visual Inspection Checklist can be used for any design deficiencies that inhibit the full performance of a BMP when calculating credit for an enhancement or conversion. **However, reduced capacity that is the result of routine maintenance not being performed does not qualify for a modification. As such, any effort that only restores a BMP to its original design capacity will not be credited.** This may include activities such as suspended solids removal or vegetative harvesting.

Permittees should document how their modification decisions were made so that the Department may verify that the modification applied was appropriate. Supporting documentation, such as a visual inspection checklist and modification tables should be submitted to the department in support of modifications. In all cases, best professional judgment should be used.

Permittees may apply a downward modification of up to 10% for each design criteria that is missing or each aspect of the practice that is undersized. The total modification should not exceed 50%, with the exception of any BMPs installed before 1991 which may have a modification of 100% applied to them. In all cases the initial BMP cannot have an efficiency that is less than zero.

EXAMPLE V.D.2

In reviewing the previous BMP conversion, the permittee determines through a field review that the initial dry pond is eligible for an efficiency modification. For all BMPs, permittees should consider the era in which they were built:

> ***Construction Era***
> *The design criteria for existing BMPs varied based on the time of planning and implementation. BMPs implemented before 1991 likely were designed for only water quantity and do not provide water quality benefit. BMPs implemented between 1991 and 1999 may have been designed for water quality and as such may be discounted.*

Permittees should select one of the following for each BMP:

1. *Pre 1991 – BMPs installed prior to 1991 with no subsequent upgrades should be treated as a conversion with no prior water quality value.*
2. *1991 – 1999 – BMPs installed between 1991 and 1999 with no subsequent upgrades may have an initial downward modification of 10% applied to their efficiencies. The initial removal efficiencies for these BMPs may also be modified downward based on any specific deficiencies present.*
3. *Post 1999 – BMPs installed after 1999 should be modified based on any specific deficiencies that present.*

Elements specific to dry ponds or dry extended detention ponds that permittees might consider for a modification include:

Missing Design Criteria

For each missing design criterion, the permittee should apply an additional downward modification of 10% to the BMP's initial removal efficiency. Missing Design Criteria for a Dry Pond may include:

- *Absence of a sediment forebay*
- *Absence of a micro pool or other form of protection at the riser outlet*
- *Short circuiting due to the initial inlet placement (note: short circuiting can qualify for an efficiency modification only if it is the result of the initial BMP design. If short circuiting is the result of sediment accumulation it should not be considered for an efficiency modification)*

and

Undersized Practice

Permittees may modify the efficiency of the BMP downward by 10% if some aspect of the BMPs original design is undersized. For a dry pond this may include:

- *Small Drainage Area – if the drainage area is 5 acres or less AND the drainage orifice is greater than 3 inches (pre 1999 BMPs only) OR if the Dry Pond has less than a minimum 12 hour draw down time*
- *If the minimum volume of the pond is less than 2 * WQv (where WQv is .5 inches * the area of the impervious cover draining to the pond).*

For the dry pond in question, the permittee determines it was constructed in 1994, is missing a sediment forebay and has no riser outlet protection. The permittee summarizes this information in a spreadsheet for submission to the Department:

Sample Modification Table/Spreadsheet

BMP Type	BMP Location	Modification Type	Downward Modification Applied (%)
Dry Pond	(*Lat, Long*)	Construction Era: 1991 - 1999	10
		Missing Sediment Forebay	10
		No Riser Outlet Protection	10
		Total	30

Based on the review of the BMP, the permittee would be able to apply a 30% downward modification to the initial efficiency of the Dry Extended Detention Pond being enhanced or converted. So instead of the initial practice having efficiencies of 20%, 20%, and 60% for TN, TP, and TSS (*Table V.C.1)* the permittee would calculate the efficiencies 30% downward for initial efficiencies of 14%, 14% and 42 percent. These downward modified efficiencies are then used to calculate the incremental efficiencies applied to their POC loads.

So instead of the calculation shown in *Example V.D.1* to calculate the POC reductions for BMP enhancement from an existing dry extended detention pond to a Wet Pond, the permittee would perform the following calculation to estimate the increased POC reductions from the conversion:

$$52\% - 14\% = 38\%$$

This efficiency is then applied to the calculated load

$$46.95\ lbs\ TN/yr\ *\ 0.38\ =\ 17.84\ lbs\ TN/yr$$

$$34.95\ lbs\ TN/yr\ *\ 0.38 =\ 13.28\ lbs\ TN/yr$$

$$13.28\ lbs\ TN/yr + 17.84\ lbs\ TN/yr = 31.12\ lbs\ TN/yr$$

The conversion, with an appropriate modification applied to the existing BMP, results in a total load reduction of 31.12 lbs TN/yr

APPENDIX V.E – Treatment Trains

Although BMPs should be reported to the Department individually, the permittee may receive credit for BMPs that are implemented as part of a treatment train. For treatment trains composed of BMPs from the Virginia Stormwater BMP Clearinghouse the Runoff Reduction Method Spreadsheet can be used to account for the impact of the treatment train. If the retrofit curves are used, the permittee will need to use their best professional judgment to identify the predominant BMP that will be credited. If BMPs with Bay Program approved efficiencies are used, the permittee may calculate the reduced loading rate that will flow to each BMP in the treatment train to estimate the appropriate reductions for each step.

APPENDIX V.F – Land Use Change

Permittees may receive credit for land use change conversions based on the number of acres converted. Conversion efficiencies for land use change are dependent on basin and are listed in Table V.F.1. Permittees may receive credit for converting:

1. Impervious to Forest – Permittees may receive credit for converting any Impervious Surface to Forest. To receive credit for the "Forest" land use, permittees should meet the tree density per acre described in the Virginia Department of Forestry's Land Use Tax Assessment Standards (*Table V.F.2*), which can also be found on the Virginia Department of Forestry's website: http://www.dof.virginia.gov/land/usetax/assessment-standards.htm.
2. Impervious to Grass – Permittees may receive credit for converting any Impervious Surface to Grass. To qualify for this credit the "Grass" must be unmanaged (i.e. no nutrient application).
3. Impervious to Pervious – Permittees may receive credit for converting any Impervious Surface to a Pervious Surface other than Forest and/or Grass. Pervious surfaces might include: lawns, unimpacted gravel, etc. If a permittee is unsure if a surface is considered "pervious," the Department should be contacted for further guidance.
4. Pervious to Forest – Permittees may receive credit for converting any Pervious Surface, including unmanaged Grass, to Forest.
5. Pervious to Grass – Permittees may receive credit for converting any Pervious Surface, other than Forest, to unmanaged Grass.

Table V.F.1 – Land Use Change Conversion Efficiency Table

Basin	Land Use from	Conversion	Edge of Stream Reductions TN(lbs/ac/year)	Edge of Stream Reductions TP(lbs/ac/year)	Edge of Stream Reductions TSS(lbs/ac/year)
James	Impervious	Forest	7.31	2.07	875.11
James	Impervious	Grass	6.87	1.55	486.31
James	Impervious	Pervious	2.29	1.60	817.29
James	Pervious	Forest	5.03	0.48	57.82
James	Pervious	Grass	4.58	0.00	0.00
Potomac	Impervious	Forest	13.91	1.80	1252.01
Potomac	Impervious	Grass	12.56	1.34	623.28
Potomac	Impervious	Pervious	6.75	1.42	1119.05
Potomac	Pervious	Forest	7.16	0.38	132.96
Potomac	Pervious	Grass	5.81	0.00	0.00
Rappahannock	Impervious	Forest	11.51	2.26	866.31
Rappahannock	Impervious	Grass	10.04	1.67	206.99
Rappahannock	Impervious	Pervious	4.19	1.74	793.13
Rappahannock	Pervious	Forest	7.32	0.53	73.18
Rappahannock	Pervious	Grass	5.85	0.00	0.00
York	Impervious	Forest	6.83	1.49	749.05
York	Impervious	Grass	6.06	1.17	430.00
York	Impervious	Pervious	1.65	1.10	670.75
York	Pervious	Forest	5.18	0.40	78.30
York	Pervious	Grass	4.41	0.08	0.00

Table V.F.2 - Minimum Number of Trees Required Per Acre to Determine 30 Square Feet of Tree Basal Area of 40% Stocking For Classification as Forest Land

D.B.H. Range	D.B.H. in 2" Classes	Basal Area Per Tree	Per Acre	Per 1/5 Acre	Per 1/10 Acre
up to 2.9"	Seedlings		400	80	40
3.0-4.9"	4	0.0873	400	80	40
5.0-6.9"	6	0.1964	153	31	15
7.0-8.9"	8	0.3491	86	17	9
9.0-10.9"	10	0.5454	55	11	6
11.0-12.9"	12	0.7854	38	8	4
13.0-14.9"	14	1.0690	28	6	3
15.0" +	16+	1.3963	21	4	2

EXAMPLE V.F.1

A locality in the Potomac River Basin is converting 1.5 acres of contiguous land from impervious surface to forest. The trees being planted all fall between 5 and 6.9 inches in diameter at breast height (4.5 feet from ground level), so the permittee must plant at least 153 trees per acre or at least 230 trees on the site to qualify for the land use conversion. To calculate the credit the permittee will receive, the appropriate values from *Table V.F.1* should be used.

For TN:

$$1.5\ acres\ converted * 13.91 lbs\ TN/ac/yr = 20.87\ lbs\ TN/yr$$

For TP:

$$1.5\ acres\ converted * 1.80\ lbs\ TP/ac/yr = 2.7\ lbs\ TP/yr$$

For TSS:

$$1.5\ acres\ converted * 1252.01\ lbs\ TSS/ac/yr = 1{,}878.02\ lbs\ TSS/yr$$

Through the land use conversion the permittee has offset 20.87 lbs TN/yr, 2.7 lbs TP/yr, and 1,878.02 lbs TSS/yr.

APPENDIX V.G – Forest Buffers

Forest Buffers can be credited as both a land use change and efficiency BMP. The land use change component should be credited in accordance with the applicable section of *Table V.F.1* in *Appendix V.F*. The efficiency is applied at up to a 2-to-1 ratio for upland acres that drain to the buffer as sheetflow (i.e. if a one acre buffer is installed, but only 1.5 upland acres drains to the buffer as sheetflow, the permittee may only receive the efficiency credit for 1.5 acres). The following established efficiencies for TP, TN, and TSS should be used (*Table V.G.1*):

Table V.G.1 - Efficiencies for Forest Buffers Applied to Two Upland Acres per Acre of Buffer

Practice	TN	TP	TSS
Forest Buffer	25%	50%	50%

EXAMPLE V.G.1

A permittee in the Potomac River basin has identified an area of regulated land adjacent to a stream as a candidate site for a forest buffer. The site has 311.14 linear feet of stream that can be buffered with an average width of 35 feet for a total of a 0.25 acre forest buffer. The land the forest buffer will be implemented on and the land draining to the buffer is all urban pervious.

Calculating the nutrient reductions provided by this BMP is a two part process. The first step is to calculate the reductions that result from the land use conversion. The permittee is converting pervious surface to forest, so using *Table V.F.1* in *Appendix V.F*, the permittee can identify the appropriate conversion factor, which is 7.16 lbs/acre for nitrogen. The permittee should multiply this value by the acres changed to calculate the land use change reduction for the site:

$$7.16\ lbs\ TN/ac/yr * \ 0.25\ acres = 1.79\ lbs\ TN/yr$$

In addition to the land use change credit, the permittee will also receive an efficiency credit for this BMP. Again, the permittee should calculate the loading rate for the land draining to the BMP. Upland acres are treated by forest buffers at a ratio of 2:1, so there are:

$$0.25\ acres\ converted * 2 = \ 0.5\ upland\ acres\ treated$$

The permittee verifies that there are at least 0.5 upland acres draining to the buffer as sheetflow, so the permittee may take the full efficiency credit for this forest buffer.

The permittee should multiply the number of upland acres treated by the appropriate loading rate from Section I.C.2.a.(4) in the MS4 permit, in this case *Table 2b* for the Potomac watershed.. As noted above, all the land draining to the BMP is urban pervious so for nitrogen, the loading rate for all acres draining to the buffer is 10.07 lbs. To estimate the loading rate after the BMP is applied, the permittee should multiply the initial loading rate by the BMPs efficiency, which is 25% (*Table V.G.1*):

$$10.07\ lbs\ TN/ac/yr * \ 0.25 = 2.52\ lbs\ TN/ac/yr$$

The permittee should multiply the upland acres treated by this modified loading rate to calculate the pounds of nitrogen reduced:

$$2.52\ lbs\ TN/ac/yr * \ 0.5\ acres = 1.26\ lbs\ TN/yr$$

This result should be added to the result from the land use conversion for a total reduction of:

$$1.79\ lbs\ TN/yr + 1.26\ lbs\ TN/yr = 3.05\ \ lbs\ TN/yr$$

With the installation of the forest buffer, this permittee has reduced its annual load of TN by 3.05 lbs/yr. The same procedure can be followed to calculate the reductions for TP and TSS.

APPENDIX V.H – Urban Stream Restoration

For urban stream restoration projects that have been implemented since June 30, 2009 and those that cannot conform to any of the four protocols for stream restoration, permittees should use the interim approved removal rates developed by the Bay Program to calculate credits. These efficiencies can be found in *Table V.H.1*.

Table V.H.1 – Urban Stream Restoration Interim Approved Removal Rates

BMPs	How Credited	TN	TP	TSS
Stream Restoration	Mass reduction/length (lbs/linear ft)	0.075	0.068	43.4

In addition to the removal rates, there are four established protocols for urban stream restoration that a permittee may use to calculate reductions from urban stream restoration projects. However, the Department strongly recommends that permittees use the interim approved removal rates to calculate reductions for stream restoration projects during Action Plan development because the Stream Restoration Protocols are still actively under review and revision.

The four protocols are:

1. Prevented Sediment During Storm Flow
2. Instream and Riparian Nutrient Processing During Base Flow
3. Floodplain Reconnection Volume
4. Dry Channel Regenerative Stormwater Conveyance (RSC) as an Upland Stormwater Retrofit

These protocols, and the interim removal rates, may only be applied to 0-3rd order streams and credit cannot be received for improvements to stream sections that are tidally influenced. The first three protocols require direct measurements to estimate pollutant reductions. Pollutant reductions for the fourth option can be calculated using the curves provided by the Bay Program for the other runoff reduction BMPs. Full requirements for each type of stream restoration and how they are credited in the Bay Program are described in greater detail in the following report:

> *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects*, January 2014, which can be found at: http://chesapeakestormwater.net/wp-content/uploads/downloads/2014/02/Stream_Panel_Report_Final_02062014_LONG_Version.pdf

Once the reductions from an Urban Stream Restoration project are calculated using one of the accepted methodologies, the credit a permittee may receive must be adjusted to account for the baseline reductions on any unregulated land the drains to the restored stream section. .

Permittees should incorporate verification activities into their stream restoration projects, such as periodic visual inspections, to ensure the project does not degrade.

EXAMPLE V.H.1

To meet its TMDL reductions, a Phase II permittee in the James River basin has decided to implement a stream restoration project. In accordance with the GP, the permittee may receive credit for the implementation of BMPs on unregulated lands provided any necessary baseline reduction is accounted for (Section I.C.2.b.(1)). For stream restoration projects that receive drainage from both regulated and unregulated lands, permittees may take full credit for the loads draining from regulated lands and an

adjusted credit for loads draining off unregulated lands that accounts for baseline reductions (Section I.C.2.b.(2)).

Step 1: Calculate the POC Reductions from the Proposed Stream Restoration Project:

The permittee uses the default rate (*Table V.H.1*) to calculate the stream restoration project's POC reductions. The permittee is restoring a 1,000 linear foot stream reach. The calculated reductions for this project are:

TN	TP	TSS
75 lbs/yr	68 lbs/yr	44,880 lbs/yr

Step 2: Characterize the Acres Draining to the Proposed Stream Restoration Project:

To quantify the stream restoration project reductions that can be credited toward meeting the TMDL, the permittee must first characterize the acres that drain to the project. The permittee estimates the regulated urban impervious and urban pervious acres, unregulated urban impervious and urban pervious acres, and forested acres draining to the stream length that will be restored:

	Urban Impervious Acres	Urban Pervious Acres	Total Urban Acres	Forested Acres	
Regulated Land[1]	9.08	6.37	15.45	1.90	
Unregulated Land	.21	1.64	1.85	7.36	Total
		Total	17.3	9.26	26.56

[1]Regulated Land means acres that drain to any MS4 system.

Using this information, ratios of regulated, unregulated, and forested acres to total acres can be calculated:

15.45 acres regulated land/26.56 total acres = 0.58 regulated acres

1.85 unregulated acres/26.56 total acres = 0.07 unregulated acres

9.26 forested acres/26.56 total acres = 0.35 forested acres

Step 3: Calculate the Total Reductions for Regulated and Unregulated Urban Lands

Permittees may:

1. Receive the full reduction credit for the proportion of the project that receives drainage from regulated acres
2. Receive an adjusted reduction credit for the proportion of the project that receives drainage from unregulated acres
3. NOT receive credit for the proportion of the project that receives drainage from acres that are forested.

So, to calculate the TSS credits it may receive for this stream restoration project, the permittee should multiply the total project TSS reduction calculated in *Step 1* (45,974 lbs TSS/yr) by the ratios calculated in *Step 2*:

For regulated acres: 44,880 lbs TSS * 0.58 = 26,030.4 lbs TSS

For unregulated acres: 44,880 lbs TSS * 0.07 = 3,141.6 lbs TSS

Step 4: Account for the Total Baseline Reductions on Unregulated Land

For load reduction calculated for unregulated acres must be adjusted to account for the baseline reduction required on unregulated land. This calculation is based on the loading rates found in Tables 3a-d of the permit. The impervious and pervious load reductions that must be achieved in the first permit cycle (5.0% of the total required reductions) are multiplied by 20 to estimate the entire baseline reductions needed to comply with the Chesapeake Bay TMDL by the end of the third MS4 permit cycle. For TSS the permittee calculates that the baseline loading rate for its project in the James River Basin (Table 3a) for

urban impervious acres is:

6.67 lbs TSS/ac/yr * 20 = 133.40 lbs TSS/ac/yr

and for urban pervious acres is:

0.44 lbs TSS/ac/yr * 20 = 8.80 lbs TSS/ac/yr

The total required baseline reduction can be calculated by multiplying these loading rates by the unregulated urban acres draining to the stream restoration project. For:

urban impervious acres this is:

133.40 lbs TSS/ac/yr * 0.21 Unregulated Urban Impervious Acres = 28.01 lbs TSS/yr

and for urban pervious acres this is:

8.80 lbs TSS/ac/yr * 1.64 Unregulated Urban Pervious Acres = 14.43 lbs TSS/yr

for a total baseline reduction of:

28.01 lbs TSS/yr + 14.43 lbs TSS/yr = 42.44 lbs TSS/yr

The permittee *may not* take credit for 42.44 lbs TSS reduction from the unregulated lands draining to the stream restoration project. The permittee should subtract this value from the TSS credit for unregulated acres that was calculated in *Step 3*:

3,141.6 lbs TSS/yr – 42.44 lbs TSS/yr = 3,099.16 lbs TSS/yr

The permittee may take credit for 3,099.16 lbs TSS/yr for the proportion of unregulated land draining to the stream restoration project.

Step 6: Calculate Total Reductions from Regulated and Unregulated (Non-Forested) Acres, Accounting for Required Baseline Reductions:

To calculate the credit towards meeting the reductions required under the TMDL the permittee should receive for this stream restoration project, the adjusted credit for unregulated acres calculated in *Step 5* should be added to the credit the permittee receives for the proportion of regulated acres draining to the restored stream calculated in *Step 3*:

26,030.4 lbs TSS/yr + 3,099.16 lbs TSS/yr = 29,129.56 lbs TSS/yr

The permittee should receive credit for reducing 29,129.56 lbs TSS/yr through this stream restoration project. The calculations for TN and TP can be done using the same process.

APPENDIX V.I – Urban Nutrient Management

Permittees are required under the "Turf and Landscape Management" of the permit (GP Section II.B.6.c) to develop NMPs on "all lands owned or operated by the MS4 operator where nutrients are applied to a contiguous area greater than one acre." Permittees cannot receive credit towards the TMDL reduction requirements for the development of NMPs that are required by Virginia statute or regulation. However, permittees may receive credit for NMPs that are developed for lands outside the MS4 service area[14], public lands within the MS4 service area that are one contiguous acre or less, or privately owned lands where nutrients are applied that are not golf courses. Urban Nutrient Management plans can be applied and reported in partial acres. If any BMPs are installed downstream of land where a credited urban nutrient management plan has been applied, permittees will need to account for the reduced pollutant load going to that BMP. The efficiency accepted for nutrient management is based on the risk level for the site. Where the risk level is unknown, permittees should use the blended efficiency (*Table V.I.1*).

TABLE V.I.1 – Urban Nutrient Management Removal Rate

Site Risk Level	TN	TP
High	20%	10%
Low	6%	3%
Unknown (Blended)	9%	4.5%

The removal rate represents a percent reduction of pervious load based on the number of acres the UNM plan covers. The load that is reduced should be calculated based on the loading rates in permit Tables 2a-d. How risk for the site is estimated is discussed in greater detail in the following report:

- *Recommendation of the Expert Panel to Define Removal Rates for Urban Nutrient Management,* March 2013, which can be found at: http://www.chesapeakebay.net/documents/Final_CBP_Approved_Expert_Panel_Report_on_Urban_Nutrient_Management--short.pdf

EXAMPLE V.I.1 – Nutrient Management on Unregulated Land

A permittee in the York River Basin develops an NMP for 5 acres of privately owned turf fields that are located outside of their regulated MS4 service area. Since the NMP is for unregulated land, the permittee will receive an adjusted credit for the NMP after the baseline reductions are subtracted from the total expected NMP reductions.

To calculate the reductions from the NMP that will be credited towards the TMDL reduction requirements the permittee should first calculate the POC reductions from the NMP based on the *Recommendation of the Expert Panel to Define Removal Rates for Urban Nutrient Management*. The permittee references Table 2d in the permit to calculate the POC loads for the 5 acre project:

5 acres * 7.65 lbs TN/ac/yr = 38.25 lbs TN/yr

5 acres * 0.51 lbs TP/ac/yr = 2.55 = lbs TP/yr

The risk level for the 5 acres is unknown, so the permittee uses the blended efficiency to calculate the reductions from the NMP:

38.25 lbs TN/yr * 0.09 = 3.44 lbs TN/yr

[14] If the BMP was funded by a nonpoint source grant, it may be contrary to the funding award to seek credit towards required reductions under the Special Condition

2.55 lbs TP/yr * 0.045 = 0.11 lbs TP/yr

In accordance with Section I.C.2.b.(1) the permittee must account for baseline reductions on unregulated land before taking credit for any BMPs. For NMPs, baseline is the 48% reduction on all urban pervious lands that is assumed under the WIP. The permittee may receive credit for the remaining 52% of the project's reductions:

3.44 lbs TN/yr * .52 = 1.79 lbs TN/yr

.11 lbs TP/yr * .52 = 0.06 lbs TP/yr

For developing a NMP for 5 acres of privately owned turf fields outside of the permittee's MS4 service area, the permittee may take credit for reductions of 1.79 lbs TN/yr and 0.06 lbs TP/yr.

APPENDIX V.J – Development on Prior Developed Lands (Redevelopment)

Permittees may receive credit for redevelopment projects if the pre-development pollutant load is reduced. Under VSMP regulations (9VAC25-870), development projects may be subject to either Technical Criteria II B or Technical Criteria II C:

Projects Subject to Technical Criteria II B:

Under VSMP regulations those projects subject to Technical Criteria II B permittees are (1) required to reduce phosphorous by 20% for land-disturbing activities disturbing greater than or equal to one acre that result in no net increase in impervious cover from the predevelopment condition or (2) reduce phosphorous by 10% for land-disturbing activities disturbing less than one acre that result in no net increase in impervious cover from the predevelopment condition. Permittees may take credit for these reductions. Permittees may also take credit for any Nitrogen and/or Sediment reductions that are created by the BMPs that are implemented to meet these requirements.

Projects Subject to Technical Criteria II C:

Technical Criteria II C applies to those projects that initiate construction prior to July 1, 2014 or are grandfathered in accordance with 9VAC-25-870-48. For these projects, permittees may use either the (1) performance-based criteria or the (2) technology- based criteria:

(1) Performance Based Criteria – Reductions may be credited to the permittee if the phosphorous load is reduced through development of prior developed lands (See Appendix II – Situation 3).
(2) Technology Based Criteria – If this approach is used, no additional reductions are required under the Special Condition beyond those for existing development under Special Condition requirement 6 (GP Section I.C.2.a.(6)).

APPENDIX VI – REPORTING ELEMENTS

Table VI.1 – Reporting Elements for Individual BMPs

Virginia Stormwater BMP Clearinghouse BMP	
Practice	Reporting Elements
Rooftop Disconnection	Impervious acres disconnected
Sheetflow to Vegetated Filter or Conserved Open Space 1 & 2	Area in acres treated
Grass Channel	area in acres treated by grass channel
Vegetated Roof 1 & 2	area in acres treated by vegetated roof
Rainwater Harvesting	volume of rainwater captured
Permeable Pavement 1	area in acres treated by permeable pavement and upgradient area draining to pavement, so long as it does not exceed a ratio of 2:1
Permeable Pavement 2	area in acres treated by permeable pavement
Infiltration 1 & 2	area in acres treated by infiltration practices
Bioretention 1 & 2, Urban Bioretention	area in acres treated by bioretention practices
Dry Swale 1 & 2	area in acres treated by dry swale
Wet Swale 1 & 2	area in acres treated by wet swale
Filtering Practice 1 & 2	area in acres treated by filtration practices
Constructed Wetland 1 & 2	area in acres treated by constructed wetlands
Wet Pond 1 & 2	area in acres treated by Wet Ponds
Extended Detention Pond 1 & 2	area in acres treated by Extended Detention Ponds
Chesapeake Bay Program BMPs	
Wet Ponds and Wetlands	area in acres treated by Wet Ponds or wetlands
Dry Detention Ponds and Hydrodynamic Structures	area in acres treated by Dry Detention Ponds or Hydrodynamic Structures
Dry Extended Detention Ponds	area in acres treated by Dry Extended Detention Ponds
Infiltration Practices w/o Sand, Veg.	area in acres treated by infiltration practices
Infiltration Practices w/ Sand, Veg.	area in acres treated by infiltration practices
Filtering Practices	area in acres treated by filtration practices
Bioretention C/D soils, underdrain	area in acres treated by bioretention practices
Bioretention A/B soils, underdrain	area in acres treated by bioretention practices
Bioretention A/B soils, no underdrain	area in acres treated by bioretention practices
Vegetated Open Channels C/D soils, no underdrain	area in acres treated by vegetated Open Channels C/D soils, no underdrain
Vegetated Open Channels A/B soils, no underdrain	area in acres treated by vegetated Open Channels A/B soils, no underdrain
Bioswale	area in acres treated by bioswale
Permeable Pavement w/o Sand, Veg. C/D soils, underdrain	area in acres of permeable pavement w/o Sand, Veg. C/D soils, underdrain
Permeable Pavement w/o Sand, Veg. A/B soils, underdrain	area in acres of permeable pavement w/o Sand, Veg. A/B soils, underdrain
Permeable Pavement w/o Sand, Veg. A/B soils, no underdrain	area in acres of permeable pavement w/o Sand, Veg. A/B soils, no underdrain
Permeable Pavement w/Sand, Veg. C/D soils, underdrain	area in acres of permeable pavement w/Sand, Veg. C/D soils, underdrain
Permeable Pavement w/Sand, Veg. A/B soils, underdrain	area in acres of permeable pavement w/Sand, Veg. A/B soils, underdrain
Permeable Pavement w/Sand, Veg. A/B soils, no underdrain	area in acres of permeable pavement w/Sand, Veg. A/B soils, no underdrain

Performance Standard Curve ST or RR, Establishment Retrofit Curve ST or RR, Enhancement Retrofit Curve ST or RR, Restoration Retrofit Curve Pre-restoration condition ST or RR, Restoration Retrofit Curve Post restoration condition ST or RR	total area of runoff collection, impervious area within the total, inches of runoff captured
Wetland Restoration	area in acres of restored wetlands
Stream Restoration	linear feet of stream restoration
Land Use Change BMPs	
Impervious Urban Surface Reduction	area in acres of reduced impervious surface
Forest Buffers	area in acres converted to riparian forest
Grass Buffers	area in acres converted to riparian grasses or herbaceous plants
Tree Planting	area in acres converted to forest